BALLUFF

Products
and Services

QUALITY DOWN TO THE LAST DETAIL

innovating automation

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Innovative solutions

TO MEET YOUR AUTOMATION NEEDS

#B_IIoT

SEIZE THE OPPORTUNITIES OF THE INDUSTRIAL INTERNET OF THINGS WITH BALLUFF

The future of automation is digital and interlinked. As your automation partner we accompany you step by step on the path to the smart factory. And all the while we keep your competitive ability in view. Build on our expertise and experience – we support you in exploiting the potential of the Industrial Internet of Things (IIoT).

For higher productivity, more efficiency and transparent manufacturing

When it comes to generating and transporting data, we have many years of experience with outstanding success. It is on this basis that Balluff provides you with a constantly growing portfolio of smart devices. Through the use of software, we generate true added value for your production environment. By combining powerful hardware and software, you get intelligent automation solutions – all with the goal of technological advancement.

Utilize the potential of the Industrial Internet of Things – together with Balluff

Our portfolio ranges from the IIoT capable hard- and middleware to software to intelligent system solutions. By using standardized interfaces and protocols we ensure that you can run our solutions in your existing IIoT infrastructure and on common platforms. To this end we of course make use of the communication standard IO-Link. Because IO-Link is ideally suited for the IIoT.

All this makes Balluff an enabler and solution provider for the Industrial Internet of Things.

Questions? Our experts are eager and ready to assist you.

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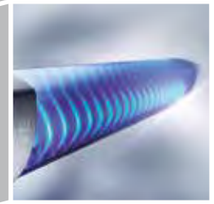

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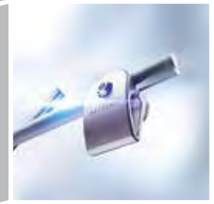

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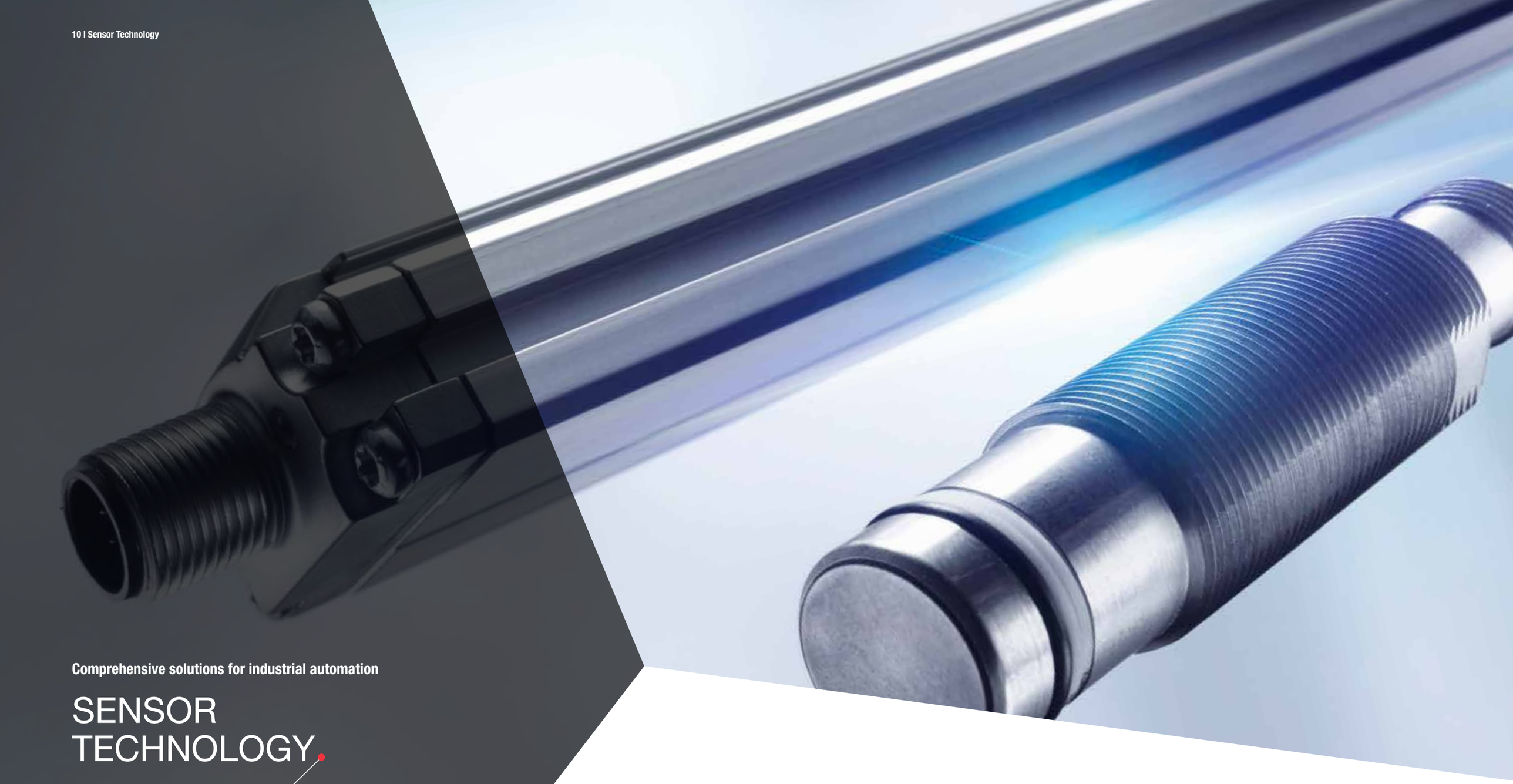

Comprehensive solutions for industrial automation

SENSOR TECHNOLOGY.

innovating automation

In the field of sensor technology, Balluff handles the entire range of technology with its various operating principles. We offer high-value sensors for any application or requirement: from linear measurement to object detection to level, temperature and pressure monitoring. For everyday industrial uses as well for tough applications in critical environments.

Our quality management regime is DIN EN ISO 9001:2015 certified. All Balluff sensors are tested in our in-house, accredited laboratory. They also meet regional and international standards and are in successful applications around the world.

Your Balluff solutions

- Inductive sensors
- Photoelectric sensors
- Capacitive sensors
- Magnetic field sensors
- Ultrasonic sensors
- Mechanical cam switches
- Magnetostrictive sensors
- Magnetic encoder systems
- Inclination sensors
- Pressure sensors
- Temperature sensors
- Flow sensors
- Condition monitoring sensors

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Highest quality and accuracy for automation

INDUCTIVE SENSORS

Automation is almost inconceivable without inductive sensors. Wherever processes are automated, non-contact position detection of metallic objects, free from wear, and with high reliability are in demand whether in machine building, electronics production, in the automobile, foods or plastics industry.

Balluff offers you a wide range of inductive sensors in various form factors for virtually any application: from standard sensors to sensors with extended switching distance, hygiene-approved, high-pressure and Ex sensors, Factor 1 or all-metal sensors. They are also available with additional ceramic or PTFE coating, for example to prevent weld splatter from adhering. You will also find all-metal with Factor 1 in our range.

Balluff inductive sensors are used to monitor, control and automate your processes and conditions with the highest level of quality, even in extreme environments.

The most important benefits

- Suitable for a variety of applications
- Contact-free and therefore wear-free
- Resistant to dirt
- Short-circuit protected
- In form factors from 3 mm Ø to 80 × 80 mm square dimensions

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PRODUCT OVERVIEW

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Product family		
BES inductive standard sensors with preferred types 	**Globally proven solutions for controlling, positioning and monitoring** Our BES inductive standard sensors with preferred types for detecting objects in metal areas are robust and reliable. With a wide range of over 500 series to choose from, we offer the right inductive sensor for any application. The technology, which is in use worldwide, has an optimum price/performance ratio, with short delivery times even in large quantities.	**Features** ■ Cylindrical sensors in Ø 6.5 mm, M8, M12, M18, M30 and block-style 40 × 40 mm ■ Flush and non-flush versions ■ Flush ranges up to 15 mm ■ Non-flush ranges up to 30 mm ■ Connector or cable connection
BES inductive 2-wire sensors 	**Universal application – various form factors** With inductive 2-wire sensors from Balluff, you can reduce the number of variants in your application in a targeted manner. This saves you storage space and costs without losing functionality. Our standard range of 2-wire technology with a range of 0 to 50 mm includes sensors in M8 to M30. And it is suitable for most PNP or NPN control systems. Our inductive 2-wire sensors are also available with increased switching distance.	**Features** ■ Sensors for DC, AC, and AC/DC power supplies ■ In cylindrical housings for flush or non-flush mounting ■ With cable and connector variants
BHS high-pressure rated inductive sensors 	**Perfect for use in hydraulic cylinders and valves** Our pressure-rated inductive sensors withstand pressure of up to 500 bar. They are, therefore, perfectly suited for position monitoring of your hydraulics, such as for end position verification of hydraulic cylinders or monitoring valve position. This capability is a result of media-resistant housing materials and special sealing. For individual applications we offer a comprehensive line of various housing diameters and thread sizes.	**Features** ■ Pressure-resistant to 500 bar ■ High-temperature-resistant up to 120 °C ■ Appropriate for use in explosion-protected areas ■ Overall dimensions from M5 to M18 ■ Short and long configurations ■ With and without fixed stop

Product family		
BES hygienic inductive sensors 	**Long service life even under difficult environmental conditions** Our hygienic sensors are extremely resistant to abrasives and aggressive media. Even the part label is protected against abrasion and chemicals. The LED indicators cannot be destroyed. And the housing construction is optimized for safe cleaning, so that the products do not retain dirt. For use in extremely aggressive environments, variations completely in PTFE are available.	**Features** ■ Custom stainless steel, such as 1.4404, 1.4571 ■ High chemical resistance ■ High degree of protection IP67 to IP69K ■ Extended temperature range available ■ Ecolab, FDA certifications available ■ Safe cleaning (CIP) ■ Different models and sizes
BES inductive Factor 1 sensors 	**More flexibility for your production** The inductive Factor 1 sensors can be used wherever dissimilar metals must be identified uniformly with high precision. These all-rounders reliably detect all metals without a reduction factor at the same sensing distance: ferrous and non-ferrous metals, steel, brass, aluminum, etc. They are also magnetic field resistant and can be used in strong electromagnetic fields. Also available: versions with PTFE coating to protect against weld spatter.	**Features** ■ High sensing distance without reduction factor for all metals ■ Magnetic field resistant ■ Installation in different metals possible ■ High-precision and flexible use ■ Different models and sizes ■ Weld spatter resistant versions available
BES inductive full-metal sensors 	**Extremely rugged for use in harsh environments** The especially resistant stainless steel inductive sensors are custom developed for use in very harsh environments. The housing and sensor front are made of stainless steel and are resistant to impact, mechanical loads and abrasive media. For welding applications we offer versions with PTFE and ceramic coating that resist weld splatter. This reduces your maintenance costs and increases the up-time of the equipment.	**Features** ■ Form factors from M8 to M30 and block-style housings ■ Switching distances from 1.5...8 mm ■ Extremely rugged ■ High switching distance ■ Factor 1 sensors and selective sensors (ferrous/non-ferrous) ■ Resistant to abrasive media and cleaning agents ■ Different models and sizes
BES magnetic-field-resistant inductive sensors 	**Magnetic field and weld field resistant – for flexible use in harsh conditions** In areas with strong electromagnetic fields, such as in welding and induction hardening equipment, magnetic-field-resistant inductive sensors work with the greatest precision. They are insensitive to magnetic fields arising from electric welding currents up to 25 kA. And with their additional ceramic coating, they are resistant to metal spatters, slag and combustion residues. They are extremely rugged.	**Features** ■ Extremely rugged ■ Magnetic field resistant ■ Weld-spatter-resistant ■ Resistant to abrasive media and cleaning agents ■ Different models and sizes

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Product family		
Weld-immune inductive sensors 	**No problem with magnetic fields, slag, metal splatter and abrasive media** Weld-immune Factor 1 inductive sensors from Balluff detect metallic objects, such as steel, aluminum, or brass, with the same switching distance. With their ceramic coating they are just as resistant to metal spatter, slag, and combustion residues as they are to magnetic fields arising from electric welding currents of up to 25 kA. Even abrasive media and cleaning agents cannot harm them. Perfect for use in welding, induction hardening installations, and similarly harsh industrial environments.	**Features** ■ Detect metallic objects with no reduction factor ■ Extremely robust, magnetic-field-resistant, and weld-spatter-resistant ■ Resistant to abrasive media and cleaning agents ■ Available in different configurations and sizes
BES temperature-rated inductive sensors 	**Highest precision even at high temperatures** Our temperature-resistant sensors are designed for temperatures up to 160 °C: this is due to their special housing and cable construction as well as their fully integrated electronics. We also offer high-pressure rated sensors, so that you can make use of a broad application spectrum.	**Features** ■ No sensing distance drift under temperature ■ Temperature ranges to 160 °C available ■ High IP68 rating ■ Stainless steel housing 1.4571 ■ Different models and sizes
BES inductive sensors for potentially explosive areas 	**Extremely reliable even in Ex zones** You can use wear-free inductive sensors in various Ex-zones: in areas in which an explosive atmosphere is a rare occurrence (Category 3G/3D), or in explosion hazard equipment or Zone 1 (Category 2G/1D) when combined with a NAMUR isolating amplifier. For flexible use, we offer a comprehensive portfolio of common sensor housings, thread sizes and the option of molded-on cables or connectors.	**Features** ■ Applicable for zones 2G/1D and 3G/3D ■ Pressure-resistant to 500 bar ■ High-temperature-resistant up to 120 °C ■ Can be combined with NAMUR amplifiers ■ Contact-free and therefore wear-free ■ Resistant to dirt ■ Short-circuit protected ■ Media-resistant
BHS and BES inductive NAMUR sensors 	**For detecting the conditions within sensitive areas** Inductive NAMUR sensors and switching amplifiers make condition detection in sensitive areas easy. The non-contact sensors are placed inside the work area and the switching amplifiers are placed outside. This assists with process stability. In addition to standard versions, we also offer high pressure variants for monitoring end positions in hydraulic cylinders or for monitoring the positions of valves. There are explosion-proof variants for potentially explosive systems or rooms in Zones 1 and 2. In addition, models are available for applications in the semiconductor industry.	**Features** ■ Support for process stability ■ Also available for hydraulic cylinders and hazardous areas ■ Faults detectable

Product family		
BES inductive ring and tube sensors 	**Ideal for detecting small parts** Our inductive ring and tube sensors work extremely reliably and are ideal for detecting small parts with a high object speed of up to 20 m/s. The integrated pulse extension of up to 150 ms makes it possible for the switching signals to be reliably utilized by control systems. You also benefit from the simple installation procedure. The sensors can be universally mounted, lined up, and stacked at a distance of > 20 mm.	**Features** ■ Reliable sensor principle for high object speeds ■ Inductive ring sensors available in various sizes ■ Inductive sensor for hoses easily installable on the feed hose ■ Stackable at a distance of > 20 mm
BAW inductive distance sensors 	**Reliable measurement of position, distance and differentiation of materials** Our inductive distance sensors measure various positions and distances. They also reliably differentiate various material types. They work without contact and are therefore wear-free, and feature long service life. Initial installation is quick and easy, which means short down-times when a sensor needs to be replaced. Included among the important fields of application for our distance sensors are the monitoring of movements in joining, pressing or clamping equipment used for machine construction or the detection of imbalances and expansions of axles.	**Features** ■ Tubular types from Ø 6.5 mm to M30 and many block-style housings ■ Compact, solid and reliable ■ Contact-free and therefore wear-free ■ Absolute measuring principle ■ Measurement range from 0.2 to 50 mm, also teachable ■ Quick response time, high reproducibility, and linearity ■ Broad temperature range, minimal temperature drift ■ Simple to use with absolute analog voltage, current or IO-Link signal
BIP inductive positioning systems 	**Can be perfectly integrated even when there is little space** The inductive positioning system is impressive in tight installation conditions: perfectly integrable, it measures the position of metallic objects with maximum precision, contact- and wear-free. The measurement values are output via IO-Link or analog. Included among the most important areas of use are monitoring of drive spindles and clamping devices or detecting linear motion: for example punch depth, gripper positions, roller positions or valve positions.	**Features** ■ Measurement ranges adjustable from 0…133 mm ■ No mechanical adjustment is necessary ■ Contact-free and therefore wear-free ■ Reliably detect travel using a simple target – a simple machine member can be used as the target ■ High repeat accuracy and precise positioning ■ Analog and digital interfaces

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Generous detection range and high reliability

PHOTOELECTRIC SENSORS

Photoelectric sensors from Balluff reliably recognize the presence of objects. They check shape, color, distance or thickness equally reliably. And they have a significantly greater detection range compared to inductive or capacitive technology.

Balluff offers you a wide variety of products. You can choose sensors using all light types from red light to infrared to laser technology, and sensors with different ranges, with and without background suppression, as well as many different form factors. For specialty applications, mini-sensors, color sensors, light bands and contrast sensors round out our portfolio. With Balluff you achieve not only the highest reliability, but also the greatest flexibility.

The most important benefits

- All light types, all principles
- Different ranges from near to far
- Tailored to the requirements of automation, mounting and handling
- Robust and reliable even under adverse environmental conditions
- Attractive features for flexible planning and installation

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PRODUCT OVERVIEW

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Product family		
BOS diffuse sensors 	**For detecting contrast differences** Our vast array of diffuse sensors offers an economical solution if you want to reliably detect contrast differences. These diffuse sensors detect objects based on their surface, color, and material. Thus, their scanning range depends on the size, shape, color, and texture of the reflective object surface. The emitter and receiver are housed together in a single unit so that you can easily install the diffuse sensors and align them quickly using their highly visible light beams. You select the most suitable light type based on your application. Depending on the model, our diffuse sensors offer you highly visible red light, invisible infrared light, or very precise laser light that is ideally suited for detecting small parts. For color-independent and surface-independent detection, we recommend diffuse sensors with background suppression. They work with red light or laser red light. Their scanning response is virtually constant, even with different reflectance levels.	**Features** ■ Ideal for detecting contrast differences dependent upon surface, color and material ■ Economical and easy to mount and align thanks to highly visible light beams ■ Shorter ranges as compared to retro-reflective and through-beam sensors ■ Only one unit to install

Product family		
BOS diffuse sensor with background suppression 	**Virtually regardless of color and surface type** Our diffuse sensors with background suppression detect objects within a set switching distance, without being affected by reflective backgrounds, just about regardless of the color and surface of the object. Object and background can be differentiated very definitively, especially as these diffuse sensors are characterized by their low gray value shift and hysteresis. Since the transmitter and receiver are housed together in a single unit to save space, you can easily mount our diffuse sensors and align them quickly. In addition, the highly visible light beam with the versions available in red light and lasers make it easier for you to do this. You can easily adjust the settings using teach-in or via a potentiometer.	**Features** ■ Reliable object detection with various operating ranges, independent of surface, color, and material ■ Detects objects against very close backgrounds, even if they are very dark against a bright background ■ Almost constant pulse width even with different reflectance ■ Only one electrical device without reflectors or separate receivers ■ With red light or the laser red light that is ideally suited for detecting small parts
BOS retroreflective sensors 	**Reliable object detection regardless of surface, color, and material** Whatever your application, Balluff offers you a wide range of retroreflective sensors. These enable you to reliably detect objects regardless of surface, color, and material. If you use a polarizing filter, our retroreflective sensors even enable you to detect shiny objects. The transmitter and receiver are housed together in a single unit so that you can easily mount it and align it quickly with its generous mounting tolerances. You select the most suitable light type based on your requirements. Depending on the model, our retroreflective sensors work with highly visible red light, invisible infrared light, or very precise laser light that is ideally suited for detecting small parts.	**Features** ■ Simple alignment thanks to generous mounting tolerances ■ Large reflectors for high ranges ■ Reliable detection – regardless of surface, color, and material ■ Also with a polarizing filter suitable for detecting shiny objects ■ Installation of only one electrical device plus reflector
BOS through-beam sensors 	**Positioning made easy** Through-beam sensors from Balluff serve to detect objects reliably, regardless of surface, color, material - even with a heavy gloss finish. They consist of separate transmitter and receiver units that are attuned to each other. When an object interrupts the light beam, this causes a change in the output signal in the receiver with absolute reliability.	**Features** ■ Ideal for positioning tasks thanks to excellent reproducibility ■ Extremely resistant to contamination and has a large functional reserve ■ Ideally suited for large operating ranges ■ Transmitter and receiver in separate housings

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Product family		
BGL through-beam fork sensors 	**Unmatched high precision and reliability** Our fork sensors with transmitter and receiver in one housing are pre-adjusted. That reduces your expense, saves valuable time during start-up and supports reliable processes. When it comes to accuracy, small parts and detail detection, and operating reliability, our fork sensors are unsurpassed. The broad product offering also ensures reliable solutions even for challenging applications such as transparency detection, water detection and web edge control.	**Features** ■ Different light types (red light, infrared, laser) ■ Rugged metal housing ■ Simple alignment to the object ■ High optical resolution and repeat accuracy ■ Fork widths from 5…220 mm with standardized mounting holes ■ Identical mechanical and optical axes ■ High process reliability since the transmitter and receiver are firmly aligned with each other ■ Save time and expense – only one electrical connection is required
BWL angle sensors 	**Precise detection at any angle and around corners** Angle sensors are used for demanding applications – for example, in feed monitoring of objects or in counting and detection in complex feed systems. The form factor and beam geometry enable the approach and detection of objects from almost every direction. They are quick to install – even in tight mounting spaces. because the emitter and receiver are permanently aligned with each other.	**Features** ■ Ideal for every application thanks to different light types (red light, infrared, laser) ■ Rugged metal housing ■ Its angled form allows extremely flexible mounting ■ High optical resolution and repeat accuracy ■ Identical mechanical and optical axes ■ High process reliability since the transmitter and receiver are permanently aligned with each other ■ No time-intensive adjustment ■ Large selection of different shapes and sizes
Optical window sensors BOW 	**Dynamic or static area checking within a stable frame** Our optical window sensors are useful where objects are to be checked not only at discrete points, but also within a range. Thanks to their multitude of beams arranged in parallel, they can detect objects within a broad window. Optical window sensors are available in a variety of dynamic and static versions. The dynamic version detects only moving objects. Feed equipment etc. does not affect detection, so that fast and randomly falling objects can be counted.	**Features** ■ Uniformly high resolution over the whole area of the frame ■ Detects small parts down to 0.8 mm diameter ■ Robust metal housing with M8 standard plug connector ■ Adjustable sensitivity and output signal length ■ Dynamic and static versions ■ Modular construction kit with numerous frame sizes

Product family		
BLG light grids 	**Count objects and measure large areas** Our light grids are ideally suited for scanning larger areas, for counting parts, for detecting stack heights (of paper, for example) or for measuring the height of pallets. This makes them superior to traditional through-beam sensors that typically scan only selectively at points. Balluff's light grids feature a switching output – for counting, for example – and an analog output for measurement tasks.	**Features** ■ Different lengths available ■ Also suitable for large objects up to a range of 2.1 m ■ Ideal for counting due to its short response time ■ Rugged metal housing ■ Invisible infrared light ■ Switching output (PNP) and analog output (0…10 V) ■ Simple connection, easily-assembled installation without additional equipment ■ Ready to use – no parameter setting necessary
BLA light bands 	**Identify parts, determine positions and count objects with high precision** Our multi-functional, high-resolution BLA light bands combines up to three different parallel measurement results in one device: you can identify parts, determine positions and count objects. Numerous measurement modes are available such as testing object diameters, positions and quantities, gap width and position, as well as edge position. Using the simple and intuitive control panel, you can program recognition of up to six different objects through digital outputs.	**Features** ■ Rugged metal housing ■ 20mm or 50 mm wide light band ■ Distances up to 2 m possible ■ Excellent resolution of 0.01 mm ■ Two freely configured analog outputs ■ Three programmable digital outputs ■ Intelligent noise contour suppression ■ Self-contained device – no additional accessories such as controller, PC or software required ■ Consistent, homogeneous light array
BFS color sensors 	**Reliably determine color and contrast – better than the human eye** Use color sensors to simplify and accelerate your automated processes, for example, in detecting color nuances in textiles or painted sheets as well as colored markings on packaging or labels. They ensure consistently high product quality and contribute to reliable production sequences. The true-color sensors differentiate even subtle color nuances and evaluate the quality of the finished pieces objectively and unerringly.	**Features** ■ High switching frequency ■ With or without display ■ Robust and industrial grade ■ High ranges to 400 mm thanks to a strong white light ■ Optional with IO-Link interface for simple parameterization ■ Differentiation between any number of objects (255 can be directly learned) ■ Very high color resolution ■ Application-specific parameterization

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Product family		
BKT contrast sensors 	**Fast detection of print markings and slight contrast differences** Contrast sensors are high-resolution diffuse sensors that distinguish objects based on their gray values. Balluff's rugged contrast sensors recognize even small differences in contrast, have a high switching frequency up to 30 kHz and are therefore particularly fast. They enable high positioning precision and are appropriate for a variety of applications, for example, in the printing and packaging industry.	**Features** ■ For fast processes, with a high switching frequency up to 30 kHz ■ Different light types (laser/red/green/blue or white light) ■ Large ranges with laser ■ Highly visible light spots ■ Pulse stretching ■ Teach-in possible ■ Also available with analog output signal ■ Available with display for simple setup ■ Different models for different applications
BLT luminescence sensors 	**Reliably detect invisible marks and markings** Our luminescence sensors, with their UV light sensor, detect objects that an unaided human eye cannot see. They are useful for detecting invisibly marked products. Or for testing lubricants which have been previously enriched with luminescent particles.	**Features** ■ UV light – no external lamp or light source required ■ Programmable with the touch of a button – without separate software ■ Robust, industrial-grade configurations
BFB fiber-based devices for plastic and glass fibers 	**Maximum flexibility thanks to plastic or glass-fiber optics** Fiber optic sensors are used where traditional photoelectric sensors are too large or inflexible. Our fiber optic sensors are combined with plastic or glass fiber optics for a complete sensor. This gives you the maximum flexibility for any application. Plastic fiber optics are used for lesser requirements in ruggedness, temperature and chemical resistance, but we also offer high-temperature plastic fiber optics. Glass fiber optics feature non-crush, temperature and chemical resistant properties.	**Features** ■ For detecting low contrast differences ■ Very fast – up to 8 kHz ■ High positioning precision ■ Flexibly mountable, simple to install ■ Mechanically rugged ■ With one-way or detecting principle ■ Straight or angled optics ■ Compact configuration for mounting on DIN rails ■ With or without display ■ Different light types (red or infrared) ■ Also optionally available with analog output signal ■ For glass or plastic fibers

Product family		
BFO plastic and glass fibers for fiber-based devices 	**Top-shelf performers with special qualities** Our plastic and glass fibers, which are designed and tested for our fiber-based devices, are available as switches or in single-use designs. You can use these wherever mounting space is at a premium: for example for small parts detection, checking parts features, parts positioning, counting and in robotics. Plastic optics are used when requirements for robustness as well as temperature or chemical resistance are low. Glass fiber optics are suitable for harsh environments – even with oil mist and influence from chemicals – as well as for temperatures of over 200 °C. Both our plastic as well as glass fibers are characterized by their transmission accuracy and speed.	**Features** ■ High function reserve ■ High quality materials and precise machining ■ Homogeneous optical properties ■ Compact, flexible, and robust with various sheathing materials, lengths, and diameters ■ Teach in on the sensor via teach-in input or via IO-Link ■ With diagnostics and condition monitoring functions upon request ■ Also available as user-configurable fibers ■ Various terminators with straight or right-angle light exit or bendable optical head for plastic fibers
BOH Micromote sensors 	**Exceptionally small sensor heads** The MicroMote system is especially small and is therefore highly flexible in its uses. It combines an external amplifier with unusually small photoelectric sensor heads. As a result it is suitable even for extremely constricted spaces and moving machine elements. A variety of housing styles ensures especially high design freedom, while precise photoelectric components ensure high process accuracy in any application.	**Features** ■ Large selection of sensor heads with maximum precision: Microspot, Nanospot, lasers, infrared, classic red-light LEDs ■ Amplifier for analog, digital, dynamic ■ Display indication of target and actual values ■ Convenient operation ■ Extremely flexible sensor cable ■ Outstanding technical parameters ■ Rugged, for challenging environments ■ Ideal for use in grippers ■ Elegant, seamless integration into machines
BOD photoelectric distance sensors 	**Specialized in optical distance measurement** Photoelectric distance sensors from Balluff help you with positioning, material flow control, or level detection, as well as in many other applications. Whether in the automotive industry, factory automation, logistics, or in constructional steelwork, you can achieve noticeable increases in productivity through reliable distance measurement and avoid faults in a targeted manner. With that in mind, we offer various, somewhat adjustable measurement ranges from 20 mm to 20 m and variants with and without background suppression ability. Our non-contact, wear-free sensors use either red light or laser light. They are housed in durable plastic or metal housings and have analog current and voltage outputs as well as digital serial or IO-Link interfaces.	**Features** ■ Ideal for distance measurements and distance monitoring of short, medium, and long measurement ranges ■ Additional switching outputs with adjustable switchpoints available for almost all products ■ Teach in on the sensor via teach-in input or via IO-Link ■ With diagnostics and condition monitoring functions upon request ■ UL approval and optional Ecolab certifications ■ Suited for harsh environments, available in IP65/67 and IP69K

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Object and level detection with patented technology

CAPACITIVE SENSORS

Balluff's capacitive sensors detect fluids, granulates and powders in direct contact or through a non-metallic container wall. Adhesive versions fit flexibly to the housing shape and are easily removable. Moisture, foam and deposits of any kind are compensated for, even through glass and plastic walls up to 10 mm thick. This makes them ideal as level detection sensors for conductive media while guaranteeing high application security.

Our capacitive sensors are available in various form factors, even especially small ones.

The most important benefits

- Contact-free and therefore wear-free
- Bounceless output signal
- Foam and residue compensation

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PRODUCT OVERVIEW

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Product family		
BCS capacitive sensors for object detection 	**Reliably detect objects – using a straight-line electrical field** Our capacitive sensors for object detection feature a straight-line electrical field. Using this, they recognize even media with a low dielectric constant at a long distance. These sensors detect liquids as well as solid bodies such as wafers, printed circuit boards, cardboard packaging, stacks of paper, bottles, plastic blocks and boards.	**Features** ■ Compact designs from Ø 6.5 mm ■ Flat designs or disc shapes with a sensing distance of up to 25 mm ■ Flush installation ■ Plastic and stainless steel designs ■ Economical designs available ■ Adjustable via potentiometer or cable teach-in ■ Plug and cable variations ■ Optionally with IO-Link
BCS capacitive level sensors without media contact 	**Non-contacting detection of liquids or bulk materials** You want to detect and monitor fill levels in containers, pipes, or tanks while in contact with the medium? This is not a problem for our capacitive level sensors without media contact. They detect the fill level of liquids and bulk materials and deliver reliable results. A wide variety of models is available for many different applications: especially compact and flat cylindrical, cubic, or disc configurations as well as pressure-rated versions and with a variety of plug and cable variants. Of particular interest: equipped with our patented Smart Level technology, the capacitive sensors from Balluff compensate for moisture, foam, and adhesion of any kind. That makes the sensors ideal for level measurement of conductive media.	**Features** ■ For fill level detection of liquids and bulk materials ■ Large selection of configurations and housing materials as well as cost-effective versions ■ Easy adjustment and setup, also via IO-Link ■ Patented Smart Level technology compensates for adhesion, moisture, and foam through glass and plastic walls up to 10 mm thick

Product family		
BCS capacitive level sensors with media contact 	**Designed for media-contacting detection of liquids or bulk materials** Our capacitive level sensors with media contact detect the level of granulates, powdery, viscous or liquid media as well as bulk goods in containers, pipes or tanks. Thanks to their great number of variants they can handle a wide range of applications. Choose from cylindrical form factors, immersibles and versions for hole or flange mounting as well as pressure-rated versions or sensors with different connectors and cables. In addition, their diverse range of housing materials, such as stainless steel, PTFE, and PEEK, ensure the best possible chemical resistance. Good to know: equipped with our patented Smart Level technology, the capacitive sensors from Balluff compensate for moisture, foam, and adhesion of any kind, and they offer high application reliability.	**Features** ■ For fill level detection of plastic granules, grains, feed and wood pellets, oils, aqueous liquids, acids, lyes, conductive powders, etc. ■ Large selection of configurations and housing materials as well as cost-effective versions ■ Easy adjustment and setup, also via IO-Link ■ Patented Smart Level technology to compensate for adhesion, foam, and moisture
BCS capacitive sensor heads for switching amplifiers 	**Small, flexible, robust, and with separate processor unit** Wherever a sensor with integrated electronics would not work optimally due to its environment, the capacitive sensor heads from Balluff offer you the precision to keep your system running. These are suitable for detecting liquid, paste-like, and powdery media – in direct contact or even through up to 4 mm thick container walls made of glass and plastic. Thanks to the compact design, our solutions work exceptionally well in tight spaces because the electronics are separated from the sensor head.	**Features** ■ Made of PTFE or stainless steel for very extreme temperatures or for the highest pressure ■ Operation via a separate remote amplifier, optionally with switching signal, analog or with IO-Link ■ Quick, easy, and cost-effective installation ■ Especially environment-resistant and robust variants available

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Product family		
BAE remote amplifiers for capacitive sensor heads 	**The right setup for every application** Balluff remote amplifiers enable our capacitive sensor heads to be setup and processed easily. Compact signal converters with switching signals, analog values, or IO-Link functionality for top-hat rail mounting are available for this purpose.	**Features** ■ For simple setting and processing of our capacitive sensor heads with compact, convenient processor or IO-Link signal converter for DIN rail mounting ■ Adjustment possible beyond critical environment conditions ■ Compact configurations and various functional modes
BCS capacitive sensors with special properties 	**Pressure- and temperature-resistant even in demanding environments** Our portfolio also includes capacitive sensors specifically for high technical requirements, such as for pressure or high temperatures. As self-adhering variants, they adapt very easily to the surface they are to be attached too in a flexible manner. Housing materials such as stainless steel, plastic, or PTFE make them ideal for use in tough environments. For use at extremely high temperatures or when space is limited, we even offer sensor heads with remote electronics. As a result, these can also be installed in hard-to-reach places and fine-tuned easily. Since their amplifiers are available with switching or analog output or with IO-Link interface, you can use the sensors across a wide range of applications. Depending on which output you choose, you can use it to detect a limit level, for example, or to set up continuous fill level detection.	**Features** ■ With stainless steel and plastic housings – also available in PTFE ■ High temperature resistance of up to 250 °C and at 180 °C, pressure-rated of up to 6 bar as well as high pressure-rated for up to 150 bar ■ Sensor heads for use with separate amplifier, IO-Link capable ■ Self-adhering variants for easy and flexible attachment

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Sure position detection even at high speeds

MAGNETIC FIELD SENSORS

Our magnetic field sensors are used chiefly on cylinders and grippers for monitoring the piston position. The sensor thus recognizes the field of the magnet integrated into the piston through the actuator wall. even at high travel speeds.

With their non-contact position detection the magnetic field sensors from Balluff work absolutely reliably and wear-free: no contact burn, no bouncing, just clean switching points.

The most important benefits

- Contact-free and therefore wear-free
- No double switching points
- Reliable even at high travel speeds

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PRODUCT OVERVIEW

innovating automation

Product family		
BMP magnetic field positioning systems 	**Intelligent linear feedback** BMP magnetic field positioning systems give you the ability to monitor running processes reliably and wear-free. They help you stay in control of various processes, ensure simultaneous processing of workpieces while remaining energy-efficient. Their use ensures high process reliability and automation quality. And it all happens reliably, whether you need to control assembly in the automobile industry, or quickly adapt to changing formats and process parameters in the packaging industry while controlling multiple pneumatic motions at the same time.	**Features** ■ Modular design for flexibility: covers a variety of cylinders over a stroke of up to 256 mm ■ Continuous monitoring of the piston position in the smallest spaces using analog voltage and current output as well as an IO-Link interface ■ Reliable results with application-specific linearity and repeat accuracy ■ High process reliability: low temperature drift and very good electromagnetic compatibility ■ Ready for the IIoT: format changes, condition monitoring and predictive maintenance
BMF magnetic field sensors for T-slot 	**For flush mounting – securely held** Our magnetic field sensors detect piston position contactlessly through the cylinder wall. Our magnetic field sensors for T-slots can be mounted directly in the slot and provide a particularly strong hold. They mount flush so that they are suitable for space-critical applications. For use in harsh environments, around weld spatter or flying sparks, we offer versions in a metal housing or with magnet-sensitive electronics for industrial environments with high welding currents. And extremely short form factors open up extra play allowance when used.	**Features** ■ Reliable switching process thanks to precise switching points ■ Contact-free and therefore wear-free ■ Insensitive to contamination ■ Thanks to the especially bright LEDs, they reliably display the switching state of the sensor even at a long distance

Product family		
BMF magnetic field sensors for C-slot 	**For flush mounting – securely held** Magnetic field sensors detect piston position contactlessly through the cylinder wall. Our magnetic field sensors for C-slots can be mounted directly in the slot and provide a particularly strong hold. They mount flush so that they are suitable for space-critical applications. Since all our C-slot sensors can be inserted from above, they will also fit where the slot ends are closed off. We also offer extremely short designs that perfectly fit grippers and short-stroke cylinders.	**Features** ■ Reliable switching process ■ Precise switching point ■ Contact-free and therefore wear-free ■ Insensitive to contamination ■ Low hysteresis
BMF magnetic field sensors for multiple slot shapes 	**For universal use** Our magnetic field sensors with flexible attachment systems are suitable for all groove shapes, such as T-, C-, round, or trapezoidal slots. They can be adapted to almost all cylinder types using special manufacturer-specific mounting brackets. As a result, a reliable tool is always available for detecting position on grippers and pneumatic cylinders. And they are highly flexible. Moreover, the switchpoint is adjusted only once and is retained even if the sensor is replaced. This way you increase the functional reliability of your equipment. Sensor replacement is safer and easier even in hard-to-reach places. A welcome side-effect: our universally applicable sensor types save you inventory space and money.	**Features** ■ One sensor for all pneumatic cylinders ■ Reliable switching process ■ Captive switchpoint ■ Contact-free and therefore wear-free ■ The best hold thanks to metal fasteners
BMF magnetic field sensors for trapezoidal slot and trapezoidal guide 	**Ingenious fastening concept** Our magnetic field sensors for trapezoidal grooves and trapezoidal guides can be mounted easily to the cylinder with mounting brackets and adapters. The sophisticated mounting bracket concept is suitable for most types of cylinder like these. In addition, we offer sensor variants that fit directly on a cylinder with a 60° and 90° trapezoidal slot without a mounting bracket. The sensors detect piston position contactlessly through the cylinder walls.	**Features** ■ Reliable switching process ■ Precise switching point ■ Contact-free and therefore wear-free ■ Insensitive to contamination ■ Simple to install

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Product family		
BMF magnetic field sensors for round cylinders 	**Secure mounting with mounting bracket and hose clamp** Our magnetic field sensors for round cylinders are securely integrated into different applications with the appropriate hose clamp and mounting bracket. The well thought-out mounting bracket concept is suitable for most types of cylinder up to 80 mm piston diameter. Piston position is registered contactlessly through the cylinder wall.	**Features** ■ Up to 80 mm piston diameter ■ Reliable switching process thanks to precise switching points ■ Contact-free and therefore wear-free ■ Insensitive to contamination ■ Firm grip ■ Mounts quickly
BMF magnetic field sensors for tie rod cylinders 	**Classic mounting system for versatile use** Our magnetic field sensors for tie rod cylinders can be reliably integrated into a myriad of applications. The sensors are traditionally mounted with mounting brackets on cylinders with tie rods and DUO rails. The well thought-out mounting bracket concept is suitable for most current types of cylinder with any piston diameter. The piston position is detected without contact through the cylinder walls.	**Features** ■ Tie rod diameter up to 17 mm ■ Reliable switching process thanks to precise switching points ■ Contact-free and therefore wear-free ■ Insensitive to contamination ■ Firm grip ■ Mounts quickly
BMF magnetic field sensors with adjustable switchpoints 	**More flexibility and comfort through adjustable multiple switching points** Our magnetic field sensors for C- and T-slots with adjustable multiple switching points enable quick integration of pneumatic and hydraulic cylinder drives in machine control. Attach our teachable sensors in their approximate position. One or more switchpoints are then set using the teach key. This allows two different switching points to be set on the same cylinder, up to eight with the IO-Link version. One sensor can thus replace multiple traditional sensors. For you this means more convenience, greater flexibility and significant cost savings.	**Features** ■ Contact-free and therefore wear-free ■ Individual installation of the switching points without tools ■ Applicable for cylinders and grippers with radial or axial magnetic polarization ■ Remote-Teach of up to 8 switching points via IO-Link ■ Adjustable hysteresis for each individual switching point ■ Extremely large, 60 mm travel path ■ Status indication via multiple colored LEDs ■ Captive switching points even after a power outage

Product family		
BMF single-connector version with two BMF magnetic field sensors 	**Save mounting costs with only one plug connector for two sensors** Two magnetic field sensors are often necessary for smaller pneumatic hydraulic cylinders or grippers in order to determine the position of the piston. Our single-connector version reduces your installation and wiring effort and expense. The electrical connection for both sensors takes place via a single 4-pin connector. This means you only need one plug position when connecting to a distribution box saving you both time and effort as well as procurement and inventory costs.	**Features** ■ Tie rod diameter up to 17 mm ■ Reliable switching process thanks to precise switching points ■ Contact-free and therefore wear-free ■ Insensitive to contamination ■ Mounts quickly
BMF tubular magnetic field sensors 	**Non-contacting as a safe bet** Tubular magnetic field sensors enable you to reliably detect positions in a non-contacting manner. They are vibration-insensitive and switch through non-ferrous metal and aluminum walls without reducing the switching distance. In doing so, they allow for a significantly greater switching distance than inductive sensors of the same configuration size. Another plug: installing it flush in steel is no problem.	**Features** ■ Small, extremely compact configuration, and very long switching distances ■ Sensors with a diameter of 6.5 mm can scan positions without making contact at a distance of up to 90 mm ■ Industrial grade and impervious to contamination ■ Position detection even through containers or pipes ■ Detection of codes using magnets

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Precise, flexible all-rounders

ULTRASONIC SENSORS

Whether for position detection, distance detection or detection of powdery and fluid media, our ultrasonic sensors are precise all-rounders. They measure fill levels, heights and sag without making contact as well as counting and monitoring the presence of objects. These universal sensors work regardless of color and surface properties. Even strong reflections from transparent objects do not affect them. And fog, dust and impurities are not a problem. The generous detection range means they are also highly reliable for greater object distances.

Ultrasonic sensors from Balluff are available as switching or analog output types. Depending on the output signal you can either reliably detect and count objects or determine distances with high precision. This makes them very versatile to use.

The most important benefits

- Contactless detection
- Reliable in critical environmental conditions such as fog, dust and impurities
- Operate irrespective of color, transparency, reflection properties and surface finish on the object
- Precise detection of even small objects with high resolution and no blind zones
- Rectangular and cylindrical heads allow for greater freedom of design
- Can be used as normally open or normally closed – various output functions

PRODUCT OVERVIEW

innovating automation

Product family		
BUS ultrasonic sensors with digital output	**Universal – measure fill levels, heights, and sag** Our ultrasonic sensors with digital output measure level, height or sag and are the ideal solution for those looking for a sensor that can be used anywhere and regardless of color or surface finish. Based on the individual requirement profile, we are able to offer this highly talented device with various voltage or current outputs as well as in variants with additional switching output.	**Features** ■ Position or object detection in solid, powdery, and liquid media ■ Checking for presence/absence of and counting objects, without making contact ■ Regardless of color and surface finish ■ Extreme precision thanks to high resolution and small blind zones ■ Analog outputs
BUS ultrasonic sensors with analog output	**Universal – for monitoring solid, powdery, and liquid media** Our ultrasonic sensors with analog output are used to detect positions or objects in solid, powdery, and liquid media. There they control the presence of objects and count them precisely without making contact. They are the ideal solution for those looking for a sensor that can be used anywhere and regardless of color or surface finish. Our multi-talented sensors are available with various output signals.	**Features** ■ Position or object detection in solid, powdery, and liquid media ■ Monitor presence and count objects without contact ■ Regardless of color and surface finish ■ Extreme precision thanks to high resolution and small blind zones ■ Analog outputs
BUS pressure-rated ultrasonic sensors	**Fill level measurement under extreme conditions** Chemically resistant ultrasonic sensors from Balluff measure fill levels in tanks and containers without making contact – both under normal pressure and at overpressures of up to 6 bar. You can even carry out fill level measurements and overflow protection simultaneously by combining switching and analog outputs. Especially advantageous: a PTFE membrane and the stainless steel housing protect the sensor from aggressive liquids in all applications.	**Features** ■ Level measurement in tanks and containers simultaneous with overflow protection ■ Pressure rated up to 6 bar ■ Chemical resistance – protected from aggressive media ■ Extreme precision thanks to high resolution and small blind zones

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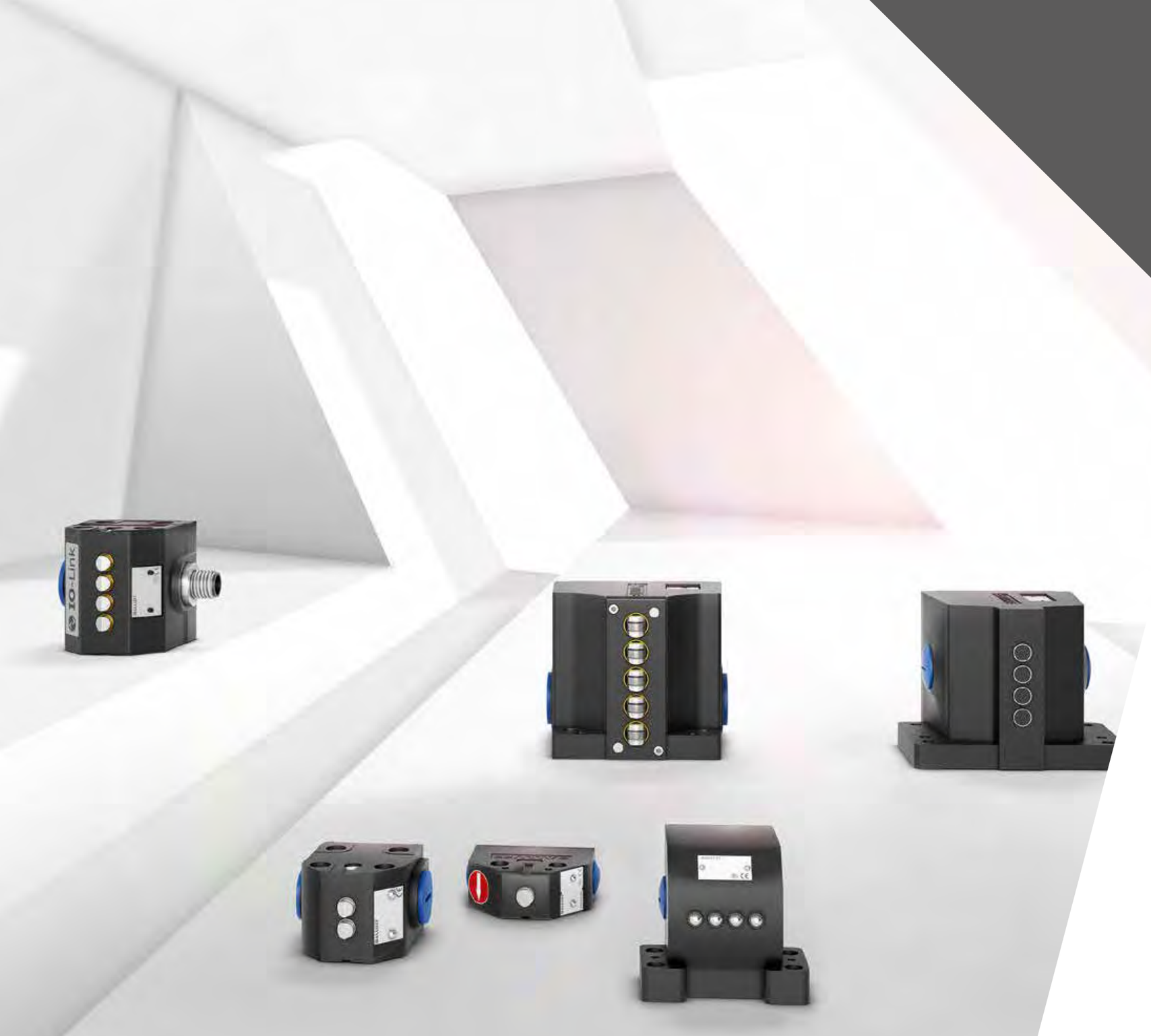

The classics for metalworking and the automobile industry

MECHANICAL CAM SWITCHES

The cam switches from Balluff are used on machine tools, presses, in flexible manufacturing centers, robots, assembly and conveying devices and in machine and equipment construction. Here they serve as command transmitters for automatic controls, for positioning and for end-of-travel switching.

The design principle of the devices, their variety of possible switching actions as well as consistent quality inspection guarantee consistently high quality and reliability.

At Balluff you can choose from nine different series and five plunger types each: Chisel, ball, roller, roller bearing and chisel with wiper plate. A large number of connection varieties is also available.

The most important benefits

- Reliable and rugged, even in harsh environments
- Flawless functionality in the event of vibrations, shock loads, temperature swings, aggressive cooling lubricants and heavy chip accumulation
- Maintenance-free, self-lubricating ram guide with plain bearing bush
- High-quality Viton seals
- Protection class IP67
- Also available with inductive switching points

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PRODUCT OVERVIEW

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Product family		
BNS mechanical single position limit switches 	**Counter with rugged housing for extreme applications** In mechanical single position limit switches without positive opening, a telescoping plunger executes the switching process. With its help, a mechanical switching element is switched in a separate sealed chamber. The optimal choice of the plunger shape in combination with our cams is decided by the application requirements. This guarantees a long service life for your application.	**Features** ■ Long service life ■ Robust housing for extreme applications ■ Three model series ■ Optional: Function indicator ■ Dual chamber system with IP67 protection: wear-free membrane with hermetic separation of the plunger mechanism and the switch interior ■ Maintenance-free, self-lubricating ram guide with plain bearing bush
BNS mechanical multiple position switches 	**Counter with rugged housing for extreme applications** In mechanical multiple position limit switches without positive opening, a telescoping plunger executes the switching process. With its help, a mechanical switching element is switched in a separate sealed chamber. The optimal choice of the plunger shape in combination with our cams is decided by the application requirements. This guarantees a long service life for your application.	**Features** ■ Long service life ■ Robust housing for extreme applications ■ IO-Link adaptable ■ Six model series ■ Depending on the model series, up to 16 interfaces ■ Function indicator, optional ■ Dual chamber system with IP67 protection: wear-free membrane with hermetic separation of the plunger mechanism and the switch interior ■ Maintenance-free, self-lubricating ram guide with plain bearing bush

Product family		
BNS mechanical single position limit switches with safety switch positions 	**Reliable forcible opening even with welded contacts** Do you value reliable switching even with welded contacts? Then equip your safety functions such as emergency stops or limit stops with Balluff safety switches. Their switching process is triggered by a rigid plunger that actuates a mechanical switching element with forcible opening. If this plunger moves, it breaks the contact. Your reliable, safe choice.	**Features** ■ Also suitable for welded contacts ■ Safety function in accordance with DIN EN 60204-1/VDE 0113 and DIN EN 60947-5-1
BNS mechanical multiple position limit switches with safety switch positions 	**Reliable forcible opening even with welded contacts** Do you value reliable and safe switching even with welded contacts? Then equip your safety functions such as emergency stops or limit stops with Balluff safety switches. Their switching process is triggered by a rigid plunger that actuates a mechanical switching element with forcible opening. If this plunger moves, it breaks the contact. Good to know: the number of safety switch positions in a single multiple position switch is arbitrary and can also be combined with standard switching elements.	**Features** ■ Also suitable for welded contacts ■ Safety functions in accordance with DIN EN 60204-1/VDE 0113 and DIN EN 60947-5-1 ■ Four model series ■ Depending on the model series, up to 16 switch positions ■ Freely selectable number of safety switch positions in one multiple position switch ■ Safety switch positions can be combined with standard switching elements
BNS mechanical single position limit switches with positive opening 	**Secured switching even with welded contacts** Safety switching elements are not feasible due to the design, especially with mechanical single position limit switches in smaller configurations. In contrast, solutions with positive opening already exist. In these, the switching process is triggered by a rigid plunger that actuates a mechanical switching element with forcible opening. However, should this plunger move, it breaks the contact. This means that you have reliable control of switching processes even with welded contacts.	**Features** ■ Also suitable for welded contacts ■ Two model series ■ Dual chamber system with IP67 protection: wear-free membrane with hermetic separation of the plunger mechanism and the switch interior ■ Maintenance-free, self-lubricating ram guide with plain bearing bush ■ Rigid plunger

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Product family		
BNS mechanical multiple position limit switches with positive opening 	**Secured switching even with welded contacts** Safety switching elements are not feasible due to the design, especially with mechanical multiple position limit switches in smaller configurations. In contrast, solutions with positive opening already exist. In these, the switching process is triggered by a rigid plunger that actuates a mechanical switching element with forcible opening. However, should this plunger move, it breaks the contact. This means that you have reliable control of switching processes even with welded contacts.	**Features** ■ Also suitable for welded contacts ■ Two model series ■ Depending on the model series, up to twelve switch positions ■ Freely selectable number of switching points with positive opening ■ Dual chamber system with IP67 protection: wear-free membrane with hermetic separation of the plunger mechanism and the switch interior ■ Maintenance-free, self-lubricating ram guide with plain bearing bush ■ Rigid plungers
BES inductive single position limit switches 	**Non-contacting and thus free from wear during operation** Our inductive single position limit switches combine the advantages of an inductive sensor with those of our mechanical housing-based line of products by carrying over their robust housings and using a reliable inductive switching element for the switching function. As a result, you benefit from compact configurations and high switching distances, which enable non-contacting and thus wear-free operation. And since the switching elements are equipped with LEDs, you can immediately recognize each switching function on the housing cover.	**Features** ■ Reliable inductive active principle ■ Function indicator with LEDs ■ Compact design ■ Mechanical housing normed to the fixing mass can be used ■ Long switching distances ■ Contact-free and therefore wear-free ■ IP67: Resistant to aggressive cooling lubricants
BNS inductive multiple position switches 	**Working without making contact and close to each other** Our inductive multiple position limit switches combine the advantages of an inductive sensor with those of our mechanical housing-based line of products. By carrying over their robust housings and using a reliable inductive switching element for the switching function. As a result, you benefit from compact configurations and high switching distances, which enable non-contacting and thus wear-free operation. The coordinated transmission frequencies of the inductive switching elements allow for a tight sequential arrangement. And since the switching elements are equipped with LEDs, you can immediately recognize each switching function on the housing cover.	**Features** ■ Reliable inductive active principle ■ LED function display for each switching point ■ Compact design ■ Mechanical housing normed to the fixing mass can be used ■ Long switching distances ■ Contact-free and therefore wear-free ■ Tight sequential arrangement possible by coordinated transmission of switching frequencies ■ IP67: Resistant to aggressive cooling lubricants

Product family		
BNS mechanical multiple position limit switches with interchangeable plunger unit 	**Interchangeable unit for quick and easy plunger replacement** Our mechanical multiple position limit switch with interchangeable unit are available for standard applications as well as with safety switch positions for increased requirements. With them, the entire switch does not have to be removed to replace individual plungers. Loosening of two screws is enough to remove the plunger unit. This saves you time and money.	**Features** ■ Short service times thanks to simple replacement of the interchangeable unit ■ Fast exchange of individual ram or the entire unit directly on the machine ■ Low repair costs ■ No wiring errors ■ Depending on the model series, up to six switch positions ■ Two model series
BNS mechanical single position limit switches for extended temperature range 	**Stay cool up to 180 °C** A special switching element and a sophisticated plunger design characterize mechanical position limit switches for extended temperature ranges. They are suitable for operating temperatures of up to 180 °C. Ideal for harsh environments in mold making in the plastics industries as well as in steel and iron works.	**Features** ■ Reliable switching process ■ Temperature range of –5 to 180 °C ■ Available with high-temperature cable ■ Two model series
BNS mechanical multiple position limit switches with extended temperature range 	**Stay cool up to 180 °C** A special switching element and a sophisticated plunger design characterize our mechanical position limit switches for extended temperature ranges. They are suitable for operating temperatures of up to 180 °C. Ideal for harsh environments in mold making in the plastics and steel industries.	**Features** ■ Reliable switching process ■ Temperature range of –5 to 180 °C ■ Available with high-temperature cable ■ Up to twelve switch positions ■ Four model series

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Reliable even over long stroke lengths and in harsh conditions

MAGNETOSTRICTIVE SENSORS

Magnetostrictive sensors come into use wherever high reliability and precision is demanded in position and speed measurement over long stroke lengths.

Our contact-free and absolute measuring systems are suitable for all industry-standard interfaces for a wide range of applications. Even under extreme surrounding conditions, they guarantee a high machine and system availability.

The most important benefits

- Precise, absolute measurement without a reference run
- Contact-free, so wear- and maintenance-free
- Resistant to shock, vibration and contamination
- Hermetically sealed housing
- Highly dynamic control applications through synchronized measurement data
- High durability and long service life
- Flexible installation and handling
- Magnetostrictive sensor Configurator

Assemble your own system online
balluff.de/configuring-magnetostrictive-sensors

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PRODUCT OVERVIEW

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Product family		
BTL magnetostrictive linear position sensors in profile housing 	**Maximum flexibility with installation and use** These magnetostrictive linear position sensors with a profile design are contact-free and absolute measurement systems for the precise detection of one or more positions. They deliver convincing performance in harsh environments, for example in presses, injection molding machines or gantry robots, because they are made of a hermetically sealed IP67 aluminum housing. The magnets of the position encoder act on the measurement element through the wall of the aluminum profile.	**Features** ■ High resolution of up to 0.5 µm ■ Measuring lengths up to 7620 mm ■ Measures several positions and speeds at the same time ■ Contact-free, therefore wear-free – no downtimes, long service life ■ Easy system integration via a range of interfaces – e.g., IO-Link, Profinet, EtherCAT, SSI and analog ■ Programmable output signals – invert, configure and document the measuring range ■ Three housing variants for flexible and fast installation depending on the space requirements and application ■ Floating and captive encoders
BTL magnetostrictive linear position sensor for industrial hydraulics 	**Pressure-resistant measurement systems for a variety of cylinder applications** The most important application for our magnetostrictive linear position sensors in rod design is in hydraulic drive units. They are exceptionally well-suited for use in hydraulic cylinders for position feedback, for molding lines and rolling mills or in wind power applications. Because the sensors are installed in the pressure area of hydraulic cylinders, they have to have the same pressure resistance as the cylinder itself. The measurement element is installed in a pressure-tight tube made of non-magnetic stainless steel. The flange seals the high pressure area using an O-ring. The electronics are integrated in a protective housing outside of the cylinder on the mounting flange.	**Features** ■ High resolution of up to 1 µm ■ Measuring lengths up to 7620 mm ■ Measures several positions and speeds at the same time ■ Programmable output signals – invert, configure and document the measuring range ■ Flexible installation with various thread types ■ Contact-free, therefore wear-free – no downtimes, long service life ■ Expanded measuring possibilities with multi-magnet technology ■ Easy system integration via a range of interfaces – e.g., IO-Link, Profinet, EtherCAT, SSI and analog

Product family		
BTL magnetostrictive linear position sensors for extreme environments 	**Cylinder feedback systems for the toughest environmental conditions** Whenever you need to measure with absolute precision, you can count on the rugged linear position sensors from Balluff. These systems are made completely of stainless steel and are designed in protection classes up to IP69K or for high pressure cylinder applications up to 1000 bar. This guarantees you the highest degree of reliability and precision, even under the most extreme ambient conditions.	**Features** ■ Rugged stainless steel housing ■ Exceptional resistance to shock and vibration ■ Extreme waterproofness, IP69K ■ Temperature range of –40 to +85 °C ■ High-pressure resistant rated to 1000 bar ■ Resolution of up to 1 µm ■ Measuring lengths up to 7620 mm ■ Contact-free and therefore wear-free – no down-times
BTL redundant magnetostrictive linear position sensors 	**Maximum system availability and safety, even in harsh environments** Our multiple redundant position measurement systems meet the highest requirements for security and availability, even in harsh environments, for example, when used in safety-relevant valves and hydraulic cylinders. They offer up to three independent measurement systems in the same housing and thereby ensure increased safety during operation. The different interfaces enable diverse redundancy.	**Features** ■ Double- or triple-redundancy design ■ Temperature range of –40 to +85 °C ■ Analog and digital interfaces ■ Flexibly adjustable measuring range and signal inversion via software ■ Settings can be copied to all three measurement channels ■ Durable thanks to rugged mechanical construction ■ Contact-free and therefore wear-free
BTL magnetostrictive sensors for explosion hazard areas 	**Pressure encapsulated linear position sensors for ex zones** For use in ex zones 0 and 1 we offer pressure encapsulated rod styles with various performance profiles. Depending on the application, you can choose variants for areas with gas or dust hazards. Magnetostrictive sensors are also available for Zone 2. Rugged and pressure encapsulated versions with easily and quickly replaced electronic modules meet the specifications of the oil and gas industry for high reliability and simple service.	**Features** ■ Suitable for ex zones 0, 1 and 2 ■ Measurement ranges up to 7620 mm ■ Absolute output signal with high resolution of up to 5 µm ■ Pressure-resistant to 600 bar ■ Range of interfaces available ■ Fast commissioning through characteristic curve adjustment ■ Many international certifications, such as IECEx, ATEX and CSA
BTL magnetostrictive sensors for fill level measurement 	**High-precision fill level measurement for maximum hygiene standards for excellent filling results** The fill level sensor continuously performs precise measurements in applications in which exceptional hygiene is required. The measurement system is made of corrosion-free stainless steel. With a high surface quality and rounded edges, it meets the highest international hygiene standards and allows you to easily implement, for example, the strict requirements of the food industry.	**Features** ■ 100 % stainless steel for unbeatable hygiene standards and a long service life ■ Safe for sterilization (SIP) and cleaning (CIP) ■ Continuous precise measurement in the µm range for excellent filling results ■ Reliable fill level values thanks to foam compensation system ■ International certificates such as 3-A Sanitary Standard, FDA and EHEDG ■ Tri-clamp mounting

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Precise positioning in very fast-moving applications

MAGNETIC ENCODER SYSTEMS

Balluff's magnetic encoders were developed for precise positioning and speed detection in very dynamic applications. The highly-precise, fast-response encoders are optionally equipped with magnetic linear or rotational measuring elements. They are appropriate for linear as well as rotational applications, for incremental or absolute position detection.

Their rugged design makes them ideal in extreme ambient conditions. They also ensure high up-time of your machines and equipment.

The most important benefits

- Contact-free and therefore wear-free
- Incremental or absolute interfaces
- High resolution to 1 µm
- Measurement lengths to 48 m
- Flexible installation and handling
- Rugged for long operational life

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PRODUCT OVERVIEW

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Product family		
BML absolute linear magnetic encoder system 	**Dynamic and precise positioning with high repeatability** Our absolute linear magnetic encoders provide absolute position feedback in any location or orientation. They can be used immediately – without a reference run, even after a loss of operating voltage and restarting the system.	**Features** ■ Best machine performance via quick and precise measured value determination with high repeatability ■ High system availability thanks to durably stable magnetic tape with Permagnet® technology ■ Long operational life because of its rugged metal housing ■ Simple, quick installation with calibration software
BML absolute rotary magnetic encoder system 	**Highest-precision positional feedback for the most flexible use** Absolute magnetic encoders for rotary applications can be used immediately – with no homing move required. Our encoders also work with high accuracy on large diameters, are extremely compact and easy to integrate into motors.	**Features** ■ Energy saving through high precision and accuracy, low overall costs ■ High system availability thanks to durably stable magnetic tape with Permagnet® technology ■ Long operational life through its rugged metal housing ■ Simple, quick installation with calibration software

Product family		
BML incremental linear magnetic encoder system 	**Precise and flexible – for a broad spectrum of applications** The incremental linear magnetic encoders can be used for a broad spectrum of uses and for almost every measurement length. For example, the sensors assure precise positioning in energy production, in the beverage industry and in many other sectors where precise positioning is demanded. Using standardized digital and analog interfaces, our encoders can be integrated into almost all controllers.	**Features** ■ Best machine performance via quick and precise measured value determination with high repeatability ■ High system availability thanks to durably stable magnetic tape with Permagnet® technology ■ Long operational life through its rugged metal or plastic housing
BML incremental rotary magnetic encoder system 	**Precise positioning and speed control of rotating axles and shafts** Our incremental rotary magnetic encoders are used for precise positioning and speed control of rotating axles and shafts. We offer the appropriate sensor for almost every shaft diameter. Using standardized digital and analog interfaces, our encoders can be integrated into almost all controllers and also provide the proper drive in torque motors.	**Features** ■ Lower process and inventory costs through flexible use of the measuring element in a circular segment ■ Low total costs ■ High system availability thanks to durably stable magnetic tape with Permagnet® technology ■ Long operational life through its rugged metal or plastic housing ■ Saves space with optimum ease of integration
BML magnetic safety encoder systems 	**Designed for safety applications** Our magnetic safety encoder systems feature a safe incremental sin/cos interface and a safe absolute SSI or BiSS C interface. This makes them ideal for safety applications (certified by TÜV Rheinland). And with their long measuring length up to 48 m and very high repeat accuracy (< 1 µm) they are highly versatile.	**Features** ■ Safe: meets the requirements of DIN EN ISO 13849-1:2015 (Machine Directive, PId), IEC 61508:2010 (Functional Safety, SIL2) and EN IEC 61800-5-2:2007 (Safety Function, SIL2) ■ Saves time: easy to set up with no configuration necessary ■ Universal: measuring lengths up to 48 m, selectable resolution, high system resolution to 20 µm ■ Convenient: configuration and diagnostic functions

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Precise deviation measurement for numerous industries

INCLINATION SENSORS

Many applications require precise position control as well as continuous tracking and monitoring of rotary movement. Inclination sensors from Balluff measure the deviation from horizontal or vertical axes up to 360°. The sensors are available with two different measuring principles, making them ideal for numerous industries and applications.

The most important benefits

- Contactless and absolute
- Capacitive measuring principles
- Direct inclination measurement without costly special fabrications
- Interfaces: 4…20 mA, 0…10 V and Modbus
- Appropriate for use in harsh conditions with high protection class IP67
- Measuring range up to 360°
- Simple mounting and integration in your facility
- For use in many industries: factory automation, energy, hydraulics, packaging, plastics, rubber, tires, life sciences

PRODUCT OVERVIEW

innovating automation

Product family		
BSI inclination sensors with one measuring axis 	**360° high precision – so that nothing gets out of balance** BSI inclination sensors with one measuring axis offer you measurements along one axis over a full 360°. They reliably monitor rotational movements and enable continuous tracking. This makes these sensors perfect for optimum process control. The single-axis versions are available with two different measuring principles: fluid-based inclination sensors when you need high accuracy over the entire measuring and temperature range and MEMS-based (Micro Electro Mechanical Systems) inclination sensors for applications that require more flexibility.	**Features** **Fluid-based** ■ Modbus and 4…20 mA interface available ■ High repeat accuracy and precision ■ Extremely low temperature drift ■ Robust and compact metal housing ■ Simple mounting – four mounting holes in the housing **MEMS-based** ■ UL and CE approval ■ Interfaces: 4…20 mA, 0…10 V ■ Large selection of different measurement ranges ■ Centering function (calibration) for ease of installation ■ Two versions for different requirements ■ The compact configuration saves space
BSI inclination sensors with two measuring axes 	**Measure two axes with only one sensor** Our biaxial BSI inclination sensors are MEMS-based (Micro Electro Mechanical Systems). They have compact chips with microelectromechanical structures that move with the inclination according to gravity. Evaluation takes place via a capacitive measuring principle. Using just one sensor you can perform position monitoring of machine components in two axes. A large number of different measuring ranges ensures optimal precision for any task.	**Features** ■ UL and CE approval ■ Interfaces: 4…20 mA, 0…10 V ■ Measure two axes with just one sensor ■ Large selection of different measurement ranges ■ Centering function (calibration) for ease of installation ■ Two versions for different requirements ■ The compact configuration saves space ■ Maintenance-free operation

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Compact and convenient measurement and monitoring

PRESSURE SENSORS

Our high-end pressure transmitters are optimally suited for pressure monitoring and pressure measurement of gaseous, fluid and viscous media. With their rotating housing and the simple, VDMA-compliant programming, they can be flexibly mounted as well as conveniently serviced. The bright LED display always gives you an overview of the current system pressure.

The most important benefits

- Compact and rugged transmitter
- Convenient to operate, with a very legible display
- Pressure range –1…600 bar
- Process connection G¼", G½", R¼", NPT¼"
- Flush with the front surface in G½" and Tri-Clamp 1½"
- Fluid temperature –40…+125 °C
- Output 4…20 mA, 0...10 V, switching points (NPN/PNP) and IO-Link
- Protection class IP67 and IP69K
- Compact with M12 connection
- Stainless steel or PVDF process connection
- Dual rotation – easily installed
- UL approval
- Pressure values directly via IO-Link

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PRODUCT OVERVIEW.

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Product family		
BSP pressure transmitters without display	**Compact and rugged thanks to a stainless steel housing** The BSP pressure transmitters without display are easy to install as well as extremely compact and rugged with stainless steel housing.	**Features** ■ Pressure range –1…600 bar ■ Measuring principle: relative pressure ■ Process connection G1/4", G1/2", R1/4", NPT1/4" ■ Front flush with Tri-Clamp 11/2" ■ M12 connection ■ Output 4…20 mA, 0...10 V or IO-Link with switching output (NPN/PNP) ■ Output 4…20 mA as a two-conductor system ■ Expanded temperature range (fluid temperature –40…+125 °C) ■ Ceramic or stainless steel measuring cell ■ Extended input voltage range 8…32 V DC ■ UL approval

Product family		
BSP pressure transmitters with display	**Convenient installation, clear information** Pressure sensors with a display are especially convenient to read. The compact housing design can be rotated two ways, making it simple to install. The orientation can be adjusted for overhead installation. Parameter setting is according to the VDMA standard. Their comprehensive diagnostic functions (operating hours, pressure peak counter, display of internal temperature trend) provide for excellent condition monitoring.	**Features** ■ Pressure range –1…600 bar ■ Measuring principle: relative pressure ■ M12 connection, independently rotational ■ Stainless steel or PVDF process connection, G1/4", G1/2", NPT1/4" ■ Selectable outputs (analog, digital, IO-Link) ■ Expanded temperature range (fluid temperature –40…+125 °C) ■ Ceramic or stainless steel measuring cell ■ UL approval ■ Comprehensive diagnostic functions
BSP front flush-mounted pressure transmitters	**High-end sensors** Our BSP front flush pressure sensors are most appropriate for pressure measurements in viscous, paste-like, crystallizing, or solids-containing media for example, with glues, greases, sealing compounds or frequently changed media. With the flush-mounted, welded stainless steel membrane, the sensors have no dead spaces and are particularly easy to clean. Their comprehensive diagnostic functions (operating hours, pressure peak counter, display of internal temperature trend) provide for excellent condition monitoring.	**Features** ■ Convenient, with easy to read display and selectable outputs (analog, digital, IO-Link) ■ Compact and rugged transmitter ■ Pressure range –1…600 bar ■ Process connection in high-end stainless steel G1/2" or 1½" Tri-Clamp ■ IP67 or IP69K ■ Pressure values directly via IO-Link ■ Expanded temperature range (fluid temperature –40…+125 °C) ■ UL approved, material test certification 3.1 (EN10204) ■ Customer-specific modifications upon request ■ Comprehensive diagnostic functions

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PRODUCT OVERVIEW

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Produktfamilie		
BFT media-contacting temperature sensors	**For direct installation in liquid or gaseous media** Our media-contacting temperature sensors can detect process temperatures continuously and/or with a switching response. For example in machine tools, mobile work machines, in pumps and compressors or for hydraulics and pneumatics. You can use different models with and without a display to handle different requirements in a variety of applications. The rugged IP67 housing makes these temperature sensors also ideal for harsh industrial environments.	**Features** ■ With rotating, easy to read display: flexible installation and operating convenience ■ Versions without display: compact form factor and high resistance to vibration ■ Interfaces: Analog signals and switching points ■ Rugged M12 connector for ease of integration ■ UL and CE approval

With and without media contact

TEMPERATURE SENSORS

With our sensors you can monitor temperature either with contact or contactlessly in a wide range of applications. Including in areas that are difficult to access or hazardous to persons. Whether without media contact or for direct use in liquid and gaseous media, our temperature sensors provide reliable operation.

The most important benefits

- Non-contact: temperature range 250…1250 °C
- Contacting: for direct use in liquid and gaseous media
- Rugged IP67 housing, suitable for harsh environments

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PRODUCT OVERVIEW.

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Product family		
BFF thermal flow controllers 	**Monitor flow using a switching function** Thermal flow controllers allow you to monitor process fluids with a switching function. For example in machine tools, on pumps and compressors. Their rugged housing makes Balluff flow controllers ideal for harsh industrial environments. With our models for thread-in or direct in-line installation you can handle a variety of requirements in many different areas of applications.	**Features** ■ No moving parts, resistant to contamination ■ Form factor for screw-in or in-line, depending on the flow amount or tube diameter ■ M12 connector for ease of integration ■ LED line or display for visualizing flow amount ■ UL and CE approval

Process reliability without compromise

FLOW SENSORS

Flow sensors let you measure and monitor the flow of process media in a wide range of applications. For example the lubricant flow or reliable circulation of cooling water. Now you can detect a pump failure early and prevent an unplanned machine or even system stop.

This is how flow sensors as well as pressure or temperature sensors contribute to process security.

The most important benefits

- Flow detection with switching function – in liquid media
- Threaded versions or in-line for a variety of applications
- Rugged IP67 housing for harsh industrial environments
- UL and CE approval

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PRODUCT OVERVIEW

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Product family		
BCM condition monitoring sensors with multi-function	**Vibration, temperature, relative humidity, barometric pressure** The Balluff condition monitoring sensor detects various physical variables such as vibration, temperature, relative humidity and barometric pressure, processes them on-board and provides the desired data to a host system via IO-Link. In addition the sensor has integrated self-awareness functions to detect and communicate its own condition. Now you are continuously informed of its temperature, number of operating hours and start cycles. **Simple with IO-Link** The standardized IO-Link protocol means you can easily parameterize the sensor and match the processing in the sensor to your specific application. This makes it simple and convenient to integrate into new or already existing systems. The flexible process data structure allows up to five measured or preprocessed data to be freely configured and cyclically transmitted. IO-Link also makes it possible to perform an acyclical request for additional statistical processing variables. **Data quantities are reduced to what is essential** You can also use automated monitoring of measurement or processing variables to define limit values for pre-alarms and main alarms, so that the sensor generates warning messages when certain events occur. By monitoring limit values the sensor can be used as a sentinel so that only relevant data are communicated over the interface. This allows data quantities to be drastically reduced which in turn prevents unnecessary data traffic.	**Features** ■ Multiple variables in one device: vibration (speed/acceleration), contact temperature, relative humidity, ambient pressure ■ Sensor self-monitoring ■ Flexible process data configuration ■ Vibration measurement per ISO 10816-3 ■ Data pre-processing (e.g. RMS, peak-to-peak, average, standard deviation, min./max.) ■ Events (pre- and main alarms) ■ Delay times for alarms ■ Search function with LED indicator (ping)

With integrated data pre-processing

CONDITION MONITORING SENSORS

BCM multi-functional condition monitoring sensors support the efficient and fault-free operation of any equipment and significantly enhance the efficiency of the overall plant. Unplanned stoppages and interruptions in the production process can now be prevented because these intelligent sensors provide you with condition information which you can use for planning predictive maintenance and repair and automating cost-intensive manual inspections. Being able to detect, process and interpret the condition of machines and equipment as well as their associated components is also essential for the Industrial Internet of Things.

The most important benefits

- Multiple measurements in one device
- Integrated processing circuitry with configurable data processing
- Configurable events and status indications
- Quick and easy to connect, ease of incorporation using IO-Link
- Compact form factor for tight mounting spaces

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Automatic identification and tracking in production

RFID – RADIO FREQUENCY IDENTIFICATION

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Our BIS Industrial RFID systems offer you the key technology for implementing essential features of a modern manufacturing facility. RFID lets you categorize objects unambiguously and trace them at any time. Processes become transparent. RFID is shaping the future because industrial identification contributes to the interplay of all the levels involved in production and clears the path for self-controlling processes. That makes autonomous systems an important component of the Smart Factory and the IIoT.

At Balluff you have access to the entire spectrum of RFID technologies with low (LF), high (HF) and ultra-high (UHF) frequency operation for virtually unlimited application. This gives you an extraordinary bandwidth of components in many different versions which you can utilize with limitless variability. One special feature: with our BIS V multi-frequency processor unit you can combine all our RFID systems flexibly with each other.

Another plus: our RFID Configurator lets you assemble your custom system online. And it's easy to use. Simply let yourself be guided by your own application, and in just a few clicks you're there.

Your Balluff solutions

- RFID system HF (13.56 MHz) BIS M
- RFID system LF (70/455 kHz) BIS C
- RFID system LF (125 kHz) BIS L
- RFID system UHF (860/960 MHz) BIS U
- RFID Configurator

Assemble your own system online
www.balluff.de/go/rfid-configurator

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High transmission speed for large volumes of data

RFID SYSTEM HF (13.56 MHZ) BIS M

The RFID system BIS M supports global ISO standards and scores with a high transmission speed for large volumes of data. Through various combination options of data carriers and read/write heads, the system can be used for a variety of applications. The system is ideal, for example, in close-range parts tracking or for applications in production control such as palletizing or recording data on the workpiece.

The most important benefits

- 4-pin standard wiring and IO-Link components
- Combine with passive data carriers of average ranges up to a max. of 400 mm
- Seamless integration in applications through global RFID standards ISO 15693 and ISO 14443A
- All bus systems commonly used on a global basis available
- Easy, fast commissioning
- Balluff high-speed components (up to eight times faster than ISO 15693)
- Customer-specific developments
- A variety of accessories for an easy integration available at all places of use

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PRODUCT OVERVIEW.

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System Components		
HF data carrier (13.56 MHz) BIS M	**Information directly available on the object** Data carriers accompany the workpieces through the entire production process. In this context, they sometimes exposed to extreme conditions from high temperatures, metal enclosure and environmental influences. Our data carriers withstand such environments without problems. The wide product range from Balluff offers you the right product for virtually any requirement.	**Features** ■ Passive data carriers: The data and the required energy are inductively coupled by the read/write head ■ All data carriers have a unique identification number (Unique ID) ■ Can be used all over the world thanks to ISO 15693 conformity ■ EEPROM data carrier, up to 992 byte memory ■ FRAM data carrier with up to 128 kB for almost unlimited feed cycles ■ Installation: Glue-on or screws ■ High level of protection up to IP68/69K ■ A wide variety of properties, such as installation on metal, high temperature, etc. ■ For time-critical applications: High-speed components, up to eight times faster than ISO 15693 ■ Special key data carriers for transfer systems that are read/write on two sides ■ Databolts are easy to attach to the object and can then be quickly detached
HF read/write heads and antennas (13.56 MHz) BIS M	**Data carrier communication partners** Our application-specific read/write heads with their industrial-grade design are simple to integrate into your system. They support the global standard ISO 15693 and in part ISO 14443A. Thanks to the rugged housing with IP67 protection they are suited for harsh environments. Their range depends on the combination of read/write head and data carrier that is used. The read/write heads are also available with IO-Link interface. These address applications for example in which, with little data, production progress, batch number or quality data must be economically logged.	**Features** ■ Easy startup, minimal down-times: status indicators directly on the read/write head ■ Up to four read/write heads can be connected to the BIS V processor units ■ Connection via M12 plug connectors, cable length 50 m ■ Read/write heads for flush installation in metal ■ M12 designs with integrated antenna ■ Special read/write heads, for example, for transfer systems for simple assembly without additional mounting brackets ■ HF loop antennas for long ranges up to 400 mm ■ Customized designs possible ■ Tool-ID components available in the same design as the BIS C read/write heads

System Components		
HF read/write heads (13.56 MHz) with integrated processor unit BIS M	**Everything in one housing** Read/write heads with integrated processor unit are the mediators between data carrier and PC or the controller. Benefit to you: because antenna, electronics and interface are located in one housing, an additional processor unit is eliminated. In addition the ease of integration reduces your installation time and expense. Variants with separate electronics are also suitable for tight installation conditions and provide leeway during the installation.	**Features** ■ Available interfaces: Serial RS232, RS485/ Subnet 16, RS422, USB ■ New also with bus interface: All-in-One RFID Reader BIS M-4008 can be directly connected to Profinet ■ Reliable use in harsh environments: rugged IP67 housing ■ Status displays directly on the housing of the reader facilitate the commissioning and minimize down times
Portable HF read/write units (13.56 MHz) BIS M	**Comfortably record data using a handheld** Our handheld devices are designed for BIS M data carriers. They are ideal for manual quality inspection or for documenting maintenance. The read/write heads reliably detect all data even in poor lighting conditions as well as in harsh environments. The data is transmitted via WLAN, Bluetooth or cable-connected USB port. The handheld devices are modularly expandable with 1D or 2D barcode readers.	**Features** ■ Windows CE® V6.0 operating system ■ Various antenna designs available ■ Range depends on antenna variant ■ Includes charging adapter and stylus ■ Base device is the powerful Zebra Workabout Pro 4 Mobile Computer ■ Pre-installed Balluff software ■ Touchscreen with large color display ■ Optional: Docking station and pistol grip ■ Customer-specific software on request
HF processor units (13.56 MHz) BIS V	**Reliable data exchange with the controller** With our BIS V RFID processor unit, you can simultaneously use up to four read/write heads. This unit processes multiple frequencies at the same time to enable mixed operation. Different processor units are no longer necessary, thereby simplifying your inventory management. For industry-independent use, the processor unit is available with all globally standard bus systems.	**Features** ■ Perfect EMC due to the robust zinc die-cast housing ■ All connections are easily accessible from the front ■ Variable mounting concept for installation on DIN rails or extrusions ■ Integrated IO-Link master port for the connection of IO-Link-capable sensors and actuators ■ Web server for status monitoring ■ Function modules for many different controller manufacturers ■ Integrated 2-port Ethernet switch for line and ring topology ■ USB interface for rapid commissioning without bus link ■ Read/write head configurable independent of interface with PC-based software tool BIS Cockpit ■ Power supply via rugged 7/8" plug for harsh industrial environments
HF communication modules (13.56 MHz) BAE	**Gateways for subnet-16™ bus topologies** HF communication modules/gateways (13.56 MHz) from Balluff are used for point-to-point connection or as a bus interface. They are integrated into your system directly via the serial interface of a host computer (RS232) or on a bus interface. The RS485 interface allows you to construct a subnet with up to 16 nodes.	**Features** ■ One communication assembly for up to 16 read heads ■ Highly compact design ■ Rugged IP67 housing for reliable use in harsh environments ■ Status displays directly on the reader housing facilitate commissioning and minimize down times ■ Solutions for long read ranges also available

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Tool identification even at short ranges

RFID SYSTEM LF (70/455 KHZ) BIS C

Especially high-performing and flexible are the BIS C low-frequency RFID systems with reliable tool identification in coolant- and lubricant-heavy machining centers. Exact positioning is not always necessary: Many data carriers can be dynamically read and identified in passing.

The LF RFID system (70/455 kHz) is also the first choice for tool identification over short ranges. Other areas of use are tool transport with conveyor systems, driverless transport systems and pallet transport systems as well as assembly technology and supply organization.

The most important benefits

- Great variety of data carriers and read/write heads for very diverse applications and difficult operating conditions
- Wear-free, maintenance-free and insensitive to dirt
- High noise immunity and assured data transfer with special checking software in the processor units
- All bus systems commonly used on a global basis available
- Memory capacity up to 8 kB

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PRODUCT OVERVIEW.

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System Components		
LF data carrier (70/455 kHz) BIS C	**Information directly on the object – even in harsh environments** Data carriers accompany the workpieces through the entire production process. In this context, they are exposed to extreme conditions such as high temperatures, metal surroundings or harsh environmental influences. Balluff data carriers handle this easily: They are insensitive to interference in metallic surroundings, high-performing in refrigerant- and lubricant-heavy environments and suitable for use in de-ionized water in an autoclave and in a vacuum. The rugged, identified-strength, weather and temperature resistant data carriers are available in many variants.	**Features** ■ EEPROM data carriers with 511, 1023, 2047 byte memory capacity ■ FRAM data carriers with 8 kB for practically unlimited read/write cycles ■ Installation: Glue-on or screws ■ 10 mm Tool-ID data carrier: Millions in use, the global standard ■ Corner data carrier with double coils avoids pallet rotations in the pallet identification ■ Data carriers can be programmed to your specifications
LF read/write heads and antennas (70/455kHz) BIS C	**Read/write heads for multiple applications** Our application-specific read/write heads in industrial-grade designs are easy to integrate into your systems. Depending on the need, various versions with cable or plug connection are available. The read/write range depends on the combination of read/write head and data carrier that is used. The range is additionally influenced by the operating mode (static versus dynamic), the installation material and the clear zone for metal.	**Features** ■ Special tool ID read/write heads in Ø 14.5 mm or M16 for flush installation in metal ■ Robust housing in IP67 ■ Cable available in 1 m, 5 m and 10 m (cannot be trimmed) ■ BCC0FCK connection cable required for connection to the BIS V processor unit ■ Customized designs possible
LF read/write heads (70/455 kHz) with integrated processor unit BIS C	**Everything in one housing** Our read heads with an integrated processor unit combine antenna, electronics and interface in one housing. For quick and easy data carrier programming, you can use the free PC software BIS Cockpit. It is also possible to program the data carriers via a processor unit with a serial connection and Balluff 007 protocol.	**Features** ■ BIS C-60R: the simplest read-only system for uncomplicated applications ■ Makes available the 8-bit information in parallel without additional components ■ 3 bytes per value are always used starting with address 0 ■ The remaining bytes on the data carriers are also usable for other purposes (with the corresponding processor units)

System Components		
Portable LF read/write units (70/455kHz) BIS C	**Reliable even in poor lighting and under harsh conditions** Our read/write devices are ideally suited for mobile reading and writing of BIS C data carriers. These are used with manual quality control or in the documentation of maintenance procedures. The data is transmitted via WLAN, Bluetooth or cable-connected USB port. Handheld devices can be expanded with 1D or 2D barcode readers.	**Features** ■ Windows CE® V6.0 operating system ■ Various antenna designs available ■ Range depends on antenna variant ■ Charging power supply and operating pin included in the scope of supply ■ Base device is the powerful Zebra Workabout Pro 4 Mobile Computer ■ Pre-installed Balluff software ■ Touchscreen with large color display ■ Optional: Docking station and pistol grip ■ Customer-specific software on request
LF processor units (70/455 kHz) BIS V	**Compact processor unit for all frequencies** With our BIS V RFID processor unit, you can simultaneously use up to four read/write heads. This unit processes multiple frequencies at the same time to enable mixed operation. Different processor units are no longer necessary, thereby simplifying your inventory management. For industry-independent use, the processor unit is available with all globally standard bus systems.	**Features** ■ Perfect EMC due to the robust zinc die-cast housing ■ All connections are easily accessible from the front ■ Variable mounting concept for installation on DIN rails or extrusions ■ Integrated IO-Link master port for the connection of IO-Link-capable sensors and actuators ■ Web server for status monitoring ■ Function modules for many different controller manufacturers ■ Integrated 2-port Ethernet switch for line and ring topology ■ USB interface for rapid commissioning without bus link ■ Read/write head configurable independent of interface with PC-based software tool BIS Cockpit ■ Power supply via rugged 7/8" plug for harsh industrial environments
LF data couplers (70/455 kHz) - BIS C	**Contactless bridging of air interfaces** Data couplers from Balluff ensure a maximum degree of flexibility. They securely transmit the data via two air interfaces. In so doing, they handle the contactless bridging of the two transitions instead of a fixed data transmission. You can use our data couplers wherever a double mechanical interface is inconvenient, for example, with rotary tables, interchangeable workpiece holders or gripper arms.	**Features** ■ Data couplers work like an extension cable ■ Maintenance-free transmission without mechanical wear ■ Fast and secure signal transmission ■ Cable lengths 1 m, 2 m and 5 m ■ Easy wiring of rotary tables, exchangeable punch heads, ■ Increase in function queries, even in previously inaccessible places

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Cost-effective solution for simple identification tasks

RFID SYSTEM LF (125 KH) BIS L

Our BIS L low-frequency RFID systems are suitable for applications that involve just identification and require less data processing. For example, often only a (read-only) code is required for tracing. The 125-kHz systems function reliably up to ranges of 100 mm and are relatively neutral with respect to materials such as water, textiles, wood and aluminum.

The most important benefits

- Data carrier memory limited to 192 bytes
- For sending smaller quantities of data
- Wide range of data carriers
- Unique ID with 5 bytes, read-only
- Read-only data carriers available (protection against manipulation)

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PRODUCT OVERVIEW

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System Components		
LF data carriers (125 kHz) BIS L 	**Availability of the information directly on the object** Data carriers accompany the workpieces through the entire production process. If you need a large number of tags for your application, LF data carriers from Balluff are an economical and reliable choice. Data carriers with read-only functionality prevent manipulation and ensure high data security.	**Features** ■ Round data carriers in various sizes: Ø 12.4 mm, Ø 20 mm, Ø 30 mm, Ø 50 mm ■ Chemical resistant glass data carriers ■ Data carriers for read only (3 or 5 bytes) or read/write with 192 bytes ■ Installation: Glue-on or screws ■ Two versions of read-only data carriers available: with a 5-byte fixed Unique ID or custom programmed with 3 bytes of data to your specification
LF read/write heads and antennas (125kHz) BIS L 	**Data carrier communication partners** Our application-specific read/write heads in industrial-grade designs are easy to integrate into your systems. Up to four read/write heads can be connected to BIS V processor units. Especially small read heads in the M12 or M18 size with separate processing electronics are available for constricted spaces. Moreover, Balluff offers you read heads with IO-Link interface. They are often used if only detection (read-only) is required for the backtracing.	**Features** ■ Robust housing in protection type IP67 ensures reliable use in harsh environments ■ Range depends on the combination of read/write head and data carrier that is used (see data sheet for the respective read/write head) ■ Connection via M12 plug connectors, cable length 50 m ■ Flat design available
LF read/write heads (125 kHz) with integrated processor unit BIS L 	**Reading and evaluation with a device** Our read heads with an integrated processor unit combine antenna, electronics and interface in one housing. Easy installation saves time and money. For tight mounting conditions you have many different variants to choose from. The rugged housing in IP67 ensures reliable use in a harsh environment.	**Features** ■ Available interfaces: Parallel and serial (RS232, RS422) ■ Additional processor unit eliminated ■ Status displays directly on the housing facilitate commissioning and minimize down times

System Components		
LF handheld devices (125 kHz) BIS L 	**Mobile data recording – simple and comfortable** Our handheld devices are outstandingly suited for mobile reading and writing of BIS L data carriers. These handheld devices are used with manual quality control or in the documentation of maintenance procedures. And they are absolutely precise and reliable even under poor lighting conditions and harsh environments. The data is transmitted via WLAN, Bluetooth or cable-connected USB port. All handheld devices from Balluff can be modularly expanded with 1D or 2D barcode readers.	**Features** ■ Windows CE® V6.0 operating system ■ Various antenna designs available ■ Range depends on antenna variant ■ Includes charging adapter and stylus ■ Base device is the powerful Zebra Workabout Pro 4 Mobile Computer ■ Pre-installed Balluff software ■ Touchscreen with large color display ■ Optional: Docking station and pistol grip ■ Customer-specific software on request
LF processor units (125 kHz) BIS V 	**One processor unit for up to four read/write heads** With our BIS V RFID processor unit, you can simultaneously use up to four read/write heads. This unit processes multiple frequencies at the same time to enable mixed operation. Different processor units are no longer necessary, thereby simplifying your inventory management. For industry-independent use, the processor unit is available with all globally standard bus systems.	**Features** ■ Perfect EMC due to the robust zinc die-cast housing ■ All connections are easily accessible from the front ■ Variable mounting concept for installation on DIN rails or extrusions ■ Integrated IO-Link master port for the connection of IO-Link-capable sensors and actuators ■ Web server for status monitoring ■ Function modules for many different controller manufacturers ■ Integrated 2-port Ethernet switch for line and ring topology ■ USB interface for rapid commissioning without bus link ■ Read/write head configurable independent of interface with PC-based software tool BIS Cockpit ■ Power supply via rugged 7/8" plug for harsh industrial environments
LF data couplers (125 kHz) BIS L 	**Secure data transmission via air interfaces** Data couplers from Balluff ensure a maximum degree of flexibility. They securely transmit the data via two air interfaces. In so doing, they handle the contactless bridging of the two transitions instead of a fixed data transmission. You can use our data couplers wherever a double mechanical interface is inconvenient, for example, with rotary tables, interchangeable workpiece holders or gripper arms.	**Features** ■ Maintenance-free transmission without mechanical wear ■ Fast and secure signal transmission ■ Various cable lengths: 1 m, 2 m and 5 m

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Continuous transmission security and data transparency

RFID SYSTEM UHF (860/960 MHZ) BIS U

The BIS U UHF systems from Balluff ensure data transparency and traceability of your automation processes. UHF is a standard technology for identification solutions covering all processes. They help to achieve fast detection of tag information and continuous transmission security. By querying decentrally stored product- and process-data, UHF is a central component of traceability applications. Our UHF BIS U systems thereby provide permanent data transparency in your entire delivery chain.

The most important benefits

- Problem-free integration in applications via globally used standard interfaces
- Corresponds to the global standard ISO 18000-6C and EPC Gen2 Class1
- Flexible use due to a wide range of different combinations of data carriers and antennas
- Ranges up to 6 m and more
- Bulk capture for simultaneous scanning of many data carriers (tags)
- Suitable for attachment to traditional control systems via bus interfaces and to higher level IT systems
- Complete tailored system solutions possible
- Many accessories for integration into a variety of applications

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PRODUCT OVERVIEW

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System Components		
UHF data carriers (860/960 MHz) BUS U 	**Reliably readable tags for harsh environments** Data carriers (or "Tags") mark the object to be identified and furnish it with additional information. This means they store the product, process and quality data to provide reliable information about the product life cycle. Our modern data carriers withstand high temperatures, humidity, chemical substances and are still reliably detectable even in metallic surroundings. In contrast to barcodes, RFID tags are also readable without optical line of sight and are resistant to soiling.	**Features** ■ All data carriers have a unique, unalterable identification number (TID) and an individually programmable EPC (Electronic Product Code) ■ Global standards ISO 18000-6C or EPC Gen2 Class1 ■ Freely writable user memory range up to 112 bytes ■ Installation: Glue-on, potted-in, or screws ■ Variants for direct mounting on metal ■ Very cost-beneficial self-adhesive Smart Labels available for one-time applications (for remaining on the product) ■ Mass applications via low-cost tags also available ■ Special silicone-free data carriers for the automobile industry ■ Special tags, temperature-resistant up to 220°C ■ Custom-tailored versions possible
UHF read/write heads and antennas (860/960 MHz) BUS U 	**Communication via the air interface** Our read/write heads are scalable and allow flexible configuration and completion of your identification task, for example, with conveyor lines or gates. Many different versions are available for different detection ranges and applications. The range here depends on the combination of read/write head or antenna and data carrier that is used and on the configuration of the processor unit.	**Features** ■ Variants for frequency ranges for the EU (865...868 MHz) and US (902...928 MHz) ■ Rugged housings up to IP67 ensure reliable use in harsh environments ■ Status LEDs directly on the read/write head ■ Startup and configuration in seconds with Auto-Setup function ■ Connection via coax cables or M12 connectors ■ Data carriers can be detected in practically any orientation ■ Read ranges up to 6 m and more possible ■ Read/write head and antennas mountable directly on metal

System Components		
Portable UHF read/write units (860/960 MHz) BUS U 	**Quickly and comfortable record data using a handheld device** Our portable UHF read/write units are designed for portable reading and writing of BIS U data carriers. These are used with manual quality control or in the documentation of maintenance procedures. The data is transmitted via WLAN, Bluetooth or cable-connected USB port. All handheld devices are absolutely reliable even under poor lighting conditions and harsh environments. They are modularly expandable with 1D or 2D barcode readers.	**Features** ■ Windows CE® V5.0 operating system ■ Includes charging adapter and stylus ■ Pre-installed demo software ■ Ideal under poor lighting conditions and in harsh environments ■ Touchscreen with large color display ■ Docking station and pistol grip for ergonomic working ■ Customer-specific software on request
UHF processor units (860/960 MHz) BIS V 	**Easily and reliably collect, process, and forward data** With our BIS V RFID processor unit, you can simultaneously use up to four read/write heads. This unit processes multiple frequencies at the same time to enable mixed operation. Different processor units are no longer necessary, thereby simplifying your inventory management. For industry-independent use, the processor unit is available with all globally standard bus systems.	**Features** ■ High performance at ranges up to 6 m and more ■ Perfect EMC due to the robust zinc die-cast housing ■ All connections are easily accessible from the front ■ LCD display and pushbuttons for simple startup ■ Different versions certified for country-specific use ■ With integrated IO-Link master port ■ Web server for convenient remote condition monitoring ■ Function modules available for many common controller manufacturers ■ BIS V USB interface for rapid commissioning without bus link

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Image processing devices for reliable detection and recording

MACHINE VISION AND OPTICAL IDENTIFICATION

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The demands on modern production equipment are high: they must be ex-tremely productive and flexible, while achieving maximum quality. Our Balluff Vision Solutions are designed precisely to meet these requirements. They reliably detect errors, check quality, and are suitable for reliable reading and verification of codes. They scan objects, 1D and 2D barcodes, and plain text.

The sensors are extremely flexible for parts checking in assembly or parts tracking in production. Their standardized interface mean the devices are simple to integrate and easy to use.

Your Balluff solutions

- Machine vision
- Optical identification

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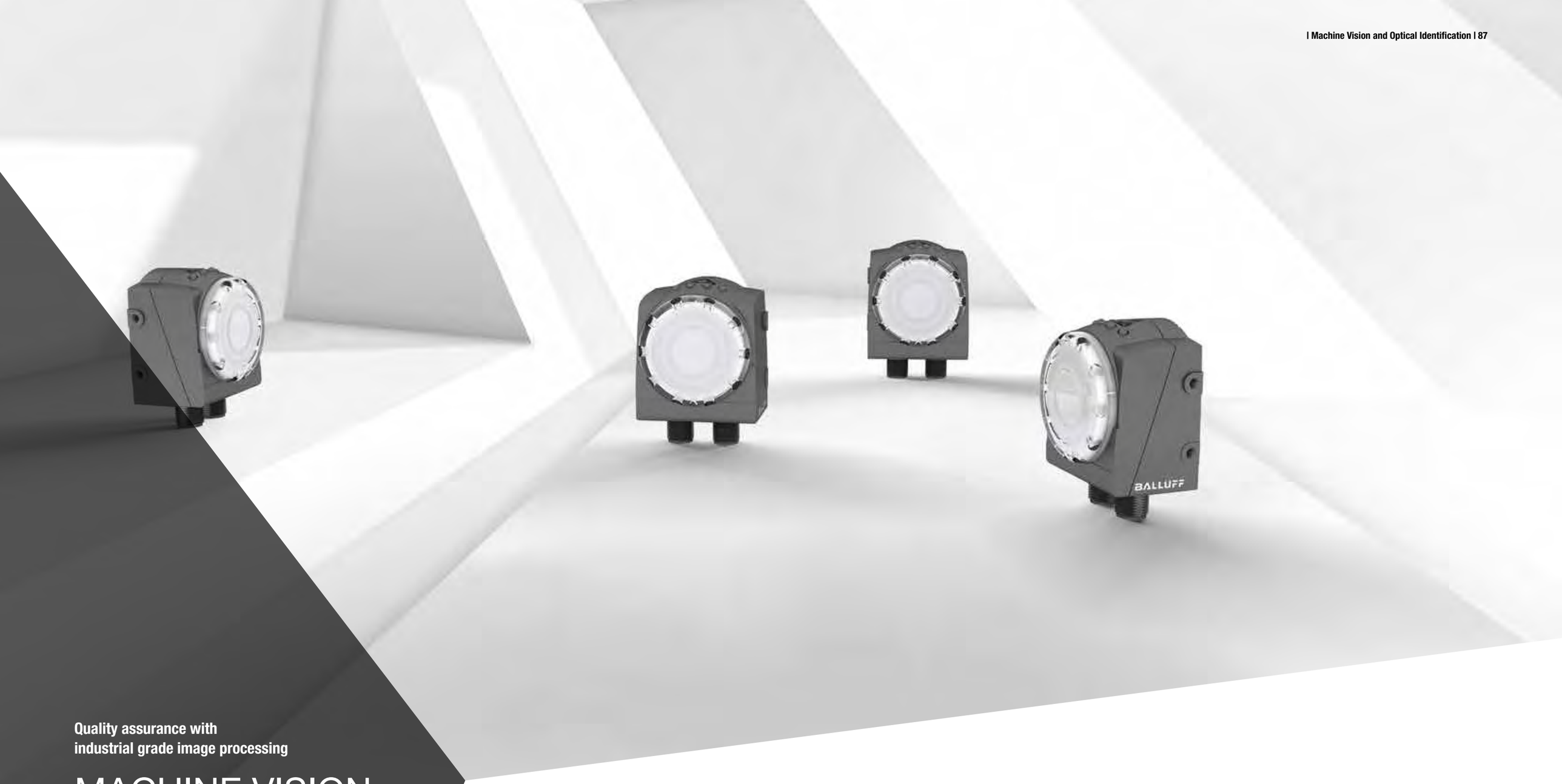

Quality assurance with industrial grade image processing

MACHINE VISION

Machine Vision from Balluff ensures quality and flexibility in modern produc-tion facilities. Through the use of industrial image processing, they provide reliable defect detection and thereby ensure exact quality control. All func-tions of the sensors can be flexibly combined.

You can also assemble your vision solution online to ensure that it precisely fits your requirements. Use the intuitive Machine Vision Configurator on our web site.

The most important benefits

- High cost-effectiveness and potential for cost reduction
- Less scrap thanks to early defect detection
- High system up-time when changing batches
- Machine Vision Configurator

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PRODUCT OVERVIEW

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Product family		
BVS-E Standard vision sensor 	**Globally proven solutions for controlling, positioning and monitoring** With our standard series of vision sensors, you control the quantity of your production process in a cost-conscious and precise manner. You can use a total of seven testing tools that can be employed independently of each other and simultaneously check multiple product features. Up to twenty storable inspections can easily be activated via the PLC. This supports continuous production even with changing workpieces. The Standard vision sensor is suitable for simple tasks in error detection.	**Features** ■ Cost savings using one vision sensor for multiple tasks ■ Early defect detection ensures the highest quality ■ Fast format changing through simple switching of inspection functions
BVS E Advanced vision sensor 	**Reliable monitoring of product quality** Advanced vision sensors efficiently and reliably monitor your production process. The identified position of the objects and the detected process data are output via Ethernet TCP/IP interface. The rapid processing of data and the combination of individual test results ensure a precise and reliable monitoring of the product quality. The wide application range for a single vision sensor saves real money. This is because a vision sensor simultaneously handles multiple inspection tasks.	**Features** ■ Quality control also on parts with random rotational position ■ Simple changing of the inspection task for changing lots means high system availability
BVS-E Universal vision sensor 	**An all-rounder with a wide range of applications** The versatile Universal vision sensors feature especially high-performance, contour-based image processing tools. They localize, inspect and count parts in any rotational orientation. The sensor can transfer the part orientation and position via the interface. The Universal vision sensor reads bar and data matrix codes especially quickly and precisely. It reliably checks up to 40 codes per second.	**Features** ■ Checking of part orientation or position reduces expenses in part management ■ Quality control also on parts with random rotational position ■ Simple changing of the inspection task for changing lots means high system availability

Product family		
BVS E Infrared vision sensor 	**Greater security and precision through infrared light** Fluctuating light conditions can impair the checking reliability of common vision sensors. At the same time, employees are often irritated by their flashing light. Our infrared vision sensors provide the solution: the infrared light is invisible to humans. Simultaneously, its fixed integrated light filter prevents ambient light from influencing the testing of your objects. This contributes to greater process security.	**Features** ■ Spurious ambient light is blocked ■ No disturbance of employees ■ Light intensity 10% higher than comparable red light sensors
3D Machine Vision rc_visard 	**3D Machine Vision that is flexible and easy to use** Our smart 3D cameras are ideal for stationary and mobile robot applications. Thanks to the integrated graphics processor and user-friendly user interface, you can implement your system quickly while keeping system costs low. **rc_visard** ■ Smart 3D camera for robotic applications ■ Easy operation through user-friendly, web-based user interface ■ High flexibility through optional software modules and GigE Vision interface ■ Low system costs because of on-board processing and smart, application-specific software modules	**Features** ■ Low system costs and high system reliability through on-board processing and application-specific software modules ■ High application flexibility through optional software modules and GigE Vision interface ■ Fast implementation thanks to user-friendly web-based user interface ■ Increased productivity through smart software modules

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Secure identification and decoding of objects

OPTICAL IDENTIFICATION

Optical identification via 1D and 2D barcodes is an established way of identifying components and objects and flawlessly managing systems and processes.

Our broad range of offerings in this area includes stationary barcode readers, mobile handheld readers and accessories for standard and industrial grade applications.

The most important benefits

- Reliable traceability of products and assembly
- Application areas: controlling supply processes (e.g., Kanban system), production control, optical tool identification
- Simple startup

Product family		
BVS E identification code reader 	**Reliable identification in the compact housing** The identification code reader uniquely identifies your products. It reliably reads 1D or 2D codes and stacked codes – up to 40 times a second. It makes no difference whether the codes were adhered with a label, printed on, lasered or directly marked. Nor are position deviations a problem for the sensor. In addition you can use the vision sensor to check ISO standard Sensor Identification Codes or verify texts and number sequences, such as in monitoring expiration dates. Identification code readers are used in the identification of components in the process and in tracking packages and in manufacturing control.	**Features** ■ Simple, self-explanatory operation ■ Simultaneously and securely read multiple codes ■ Easy linking to PLC via RS232 and Ethernet interface ■ Compact design ■ Different optics available ■ Optionally available with built-in red or infrared light source
BVS HS-P handheld code reader 	**Industrial grade handhelds with outstanding reading performance** These handheld barcode readers read all standard 1D, 2D and stacked barcodes from documents, plastic labels, circuit boards and metal parts quickly and reliably. The readers are robust and combine maximum reading performance with user friendliness. The reader offers IP65 protection and also withstands multiple falls onto concrete from up to 2 meters. This means they can be reliably used in industry, logistics and inventory control. The wireless versions with Bluetooth provide users with maximum freedom of movement. This is because reliable data transmission is possible in a surrounding area of up to 100 m around the base station.	**Features** ■ Reliable read confirmation via acoustic signal, 2 green LEDs and projection of a green LED spot on the code that has been read ■ Intuitive aiming system using a highly visible laser marking frame ■ Up to 30,000 read cycles on one charge of the lithium ion rechargeable battery ■ Work without fatigue thanks to low weight and ergonomic shape ■ High-Density versions read high-resolution codes (up to 2.5 mil for 1D) as well as large areas (up to A4) ■ Maximum read ranges up to 110 cm
BVS HS-Q handheld code reader 	**Handheld readers for versatile use in the warehouse and in logistics** The handheld readers in this series read all standard 1D, 2D and stacked barcodes as well as postal codes in every rotary position up to 40° tilt and while moving. Reading under more difficult conditions – such as displays and against a slightly reflective background – does not present any difficulties for them. The readers are suitable for reading codes on documents or code labels and offer maximum read ranges of 40 cm. The ergonomic shape and maximum 200 g weight eliminate fatigue and are easy on the user's hands.	**Features** ■ Automatic adaptation to different read situations ■ Reliable read confirmation via a green LED and an acoustic signal as well as projection of a green LED spot on the code that has been read ■ Intuitive aiming system with highly visible blue LED marking

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All the information you need at a glance

HUMAN MACHINE INTERFACES

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With our controllers and display devices, you know at all times where things stand with production and exactly where a tool is located. They reliably monitor the status and the point-of-use of machines and systems. The output signals from the sensors are converted into visual or acoustic indicators.

The controllers evaluate the results from industrial cameras and other sensors, process them and send them on to the controller. This pre-processing ensures that only the important parameters are obtained and sent over the customer network to a central controller, which protects the entire production environment from data overload.

Our displays and SmartLight LED stack lights indicate the operating status of your machine at a glance because they visualize physical variables and states.

Your Balluff solutions

- SmartLight LED stack lights
- Displays
- Industrial Controllers

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Detect operating status

SIGNALING AND DISPLAY DEVICES

Our displays and the SmartLight LED stack light display physical variables. In this way, you recognize the operating state of your machine at a glance. The displays give you the choice between analog, SSI and pulse inputs. The SmartLight visualizes progressions and trends, with the special advantage that you can correlate different colors and modes without any mechanical modifications. Installation and configuration are simple using IO-Link.

The most important benefits

- Flexible
- Easy to install
- Displays for analog, SSI or pulse input signal
- SmartLight with IO-Link and individually correlated colors and modes

PRODUCT OVERVIEW

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Product family		
BNI SmartLight – LED stack lights 	**LED stack lights with IO-Link interface** The LED stack light with IO-Link interface indicates operating states such as temperatures, fill levels or the position of a slide with a flexible color spectrum using multi-color LEDs. You can individually define the colors and have important or critical machine states displayed. The color scale indicates trends and progressions of physical variables.	**Features** ■ Easy to install ■ Up to 20 separately controllable LED circuits ■ Highly flexible since it can be modified on-the-fly with no mechanical alterations ■ Optionally with integrated sound module for acoustic signals
BAE displays 	**For visualizing various input signals** Displays from Balluff are ideal for control cabinet installation. Choose from between analog value displays, axis indicators and display modules with SSI interface or digital pulse interface. The various interfaces ensure optimal integration. And with a variety of setting possibilities you can use our displays with great flexibility. Depending on the model, parameter settings are made using function keys or on the front touch screen.	**Features** ■ Basic analog value displays: visualizes sensor data cost effectively ■ Displays with touch screen: integrated encoder power supply, plain-text parameter setting, including display color, units, linearizing, hysteresis
BAE industrial controllers 	**Transparent production processes** Do you need to quickly and directly display or change the production status and configurations of your machine vision products and other Balluff sensors and change them using a touch function? Our industrial controllers are tailor made for these tasks. Our industrial grade panel PC running on Windows 10 IOT can operate and visualize various industrial components. Use standard input and entry systems such as keyboard and mouse or touchscreen. The 12" display lets you read all the information comfortably. Our SmartVision controller directly controls industrial cameras and makes the results available to the central controller over various network interfaces.	**Features** ■ Scalable range of functions, from simple representation to high-performance data analysis ■ Industrial type form factor and mounting concepts ■ Standardized linking to a wide range of company network environments

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Safety with Balluff quality

SAFETY.

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The safe operation of machines and systems is elementary for employee protection, safeguarding productivity as well as liability security. To ensure both the safe operation of your machines and systems and to meet the safety requirements for machines and systems in industry, Balluff offers a comprehensive portfolio and solutions for your safety. This enables you to meet and reliably comply with the requirements of ISO 13849-1 Functional Safety as the standard for the safety verification according to the Machinery Directive 2006/42/EC.

Your Balluff solutions

- Safe I/O modules
- Safety sensors and switches
- Opto-electronic protective devices
- Safety guard locking devices
- Safety command devices

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Use IO-Link to easily implement safety applications

SAFE I/O MODULES

Balluff's safe I/O modules combine safety and automation technology with IO-Link technology. This provides sensor and actuator signals while also being used for safety applications. With this universal interface the integration of industrial safety technology easier than ever.

The most important benefits

- For safety applications up to PLe/SIL3
- An infrastructure for automation and safety technology
- Simple to integrate
- Can be connected to virtually any device
- Safe communication with Profisafe over Profinet

PRODUCT OVERVIEW

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Product family		
IO-Link blocks for safety applications	**IO-Link and Safety**	**Features**
	Our IO-Link blocks for safety applications and passive safety are suitable for applications up to PLd/SIL2. In addition to actuator modules, there is also a version for connecting to common binary sensors and actuators which are controlled during the automated production process over IO-Link. Thanks to universally usable M12 standard cables, you save time and money with these modules, optimize the machine design, simplify commissioning and increase rationality. In addition, you can group the machine functions and/or machine areas on a module and in this way optimize the structural overview of the machine. IO-Link blocks for safety applications are remotely serviceable via the existing IO-Link diagnostic tools and in the event of service can be replaced. Good for reducing downtimes to a minimum. Their suitability for use in the field permits equipment installations outside of the control cabinet. Even under harsh environmental conditions, such as the presence of dust, dirt, oils, water, emulsions, mechanical stresses and much more.	■ Suitable for safety applications up to PLd/SIL2 ■ Low maintenance costs when service is needed – diagnosis is thorough and component replacement easy ■ Cost savings thanks to uniform M12 single-ended cordsets ■ Remote maintenance for reduced downtimes ■ Saving in blocks by grouping and standardizing machine functions
BNI Profisafe over IO-Link	**Automation and safety technology using IO-Link combined for the first time**	**Features**
	The safe I/O module from Balluff is the first to combine automation and safety technology via IO-Link. With Safety over IO-Link, you get the best of both worlds. And integrating safety technology becomes easier than ever before. All you need is standard M12 cables for connecting virtually any safety device. Parameters are configured centrally using the controller. Safety-related information is sent directly through the master to the controller. Using Profisafe over Profinet guarantees secure communication with the controller.	■ Infrastructure for automation and safety technology up to PLe/SIL3 via IO-Link ■ Low maintenance costs in case of service thanks to comprehensive diagnostics and easy device replacement ■ Cost savings thanks to uniform M12 single-ended cordsets ■ Fewer IP addresses necessary ■ Standardized wiring concept, reliable guard locking devices can be connected directly ■ Nearly any safety device can be connected

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Reliable information exchange across all levels

INDUSTRIAL NETWORKING

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Demands on industrial networking continually increase: The rising quantities of data and ever more complex communication require high-performance components that can reliably transport the information across all levels. This is especially true when high protection ratings, robustness, use at high temperatures or special interfaces and connections for maximum security are needed.

With the intelligent combination of high-performance industrial networking technology and the IO-Link communication standard, Balluff makes flexible and smooth communication in the most varied application scenarios possible.

Your Balluff solutions

- Network modules
- Switches
- I/O blocks
- IO-Link memory modules
- Inductive couplers

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For the highest performance

NETWORK MODULES

Balluff has developed a new generation of network blocks for perfect linking of sensors and actuators. The system features highly versatile parameter setting and diagnostics possibilities that can be carried out via display, LEDs and an integrated web server.

The status LEDs on the modules are large, bright, and easy to read and interpret. This saves you time in setup, maintenance or troubleshooting. With an output current of up to 2 A, the Balluff network blocks are capable of driving almost any load. Each output also offers overload protection with LED indicator and a memory feature for easy troubleshooting. And the rugged, full-jacket enclosure also withstands high mechanical loads. For you this means full-time, overall high performance.

The most important benefits

- High performance in all networks
- Faster, simpler connection
- Reliable even in harsh environments, shock and vibration resistant
- IP67 design and rugged full-jacket enclosure
- Integrated web server
- Line topology construction

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PRODUCT OVERVIEW

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Product family		
BNI network blocks for Profinet 	**Fast, economical and robust for industrial automation** With Profinet you directly link drives and safety technology to the network environment. This Ethernet-based system is significantly faster than Profibus but can readily be combined with it. The same applies to connections with IO-Link. This will save you time and money. And it will ensure improved process quality through connectivity. Profinet can be integrated consistently from the control level to the drive, even in harsh environments.	**Features** ■ Freedom of installation ■ Simple wiring ■ Full diagnostics and centralized parameter setting with IO-Link
BNI network blocks for Profibus 	**Efficient field and process communication** Balluff offers a wide range of components for optimal Profibus use. Regardless of the controller manufacturer, you will find the optimum solution in our range of products. Profit from more efficient field and process communication, simple wiring, direct installation in your equipment and the possibility of rapid reconfiguration, even in harsh industrial environments. Another plus: Our Profibus solutions are IO-Link capable.	**Features** ■ Thorough diagnostics: no system failures ■ Centralized parameter setting: systems quickly go back to being operational ■ Time and cost savings ■ Simplified system expansion and greater investment security through IEC 61158/EN 50170 standardization
BNI network blocks for CC-Link IE-Field 	**Highly functional and practical modules** Especially for automation requirements in the Asian region, Balluff has been able to link communication on the machine and equipment level with sensor/actuator communication: CC-Link IE/Field modules for the equipment level on one hand and direct linking with the sensor/actuator level on the other. For perfect linking of I/O systems to the open, deterministic high-speed network CC-Link IE/Field there are highly functional and practical fieldbus blocks available.	**Features** ■ Display, LEDs and integrated SLMP access (Seamless Message Protocol) for diagnostics and configuration

Product family		
BNI CC-Link network blocks 	**High-performance control topologies** CC-Link is a standardized fieldbus designed to integrate the most diverse automation components of a wide range of providers. CC-Link is already the principle fieldbus technology used in Asia. CC-Link is an effective integral system that will absolutely meet your requirements. Utilize our extensive, high-quality CC-Link portfolio to implement your own powerful control topologies using products from a single source.	**Features** ■ Powerful diagnostic system for clear identification of problem areas ■ Constant data throughput, even when processing large data volumes ■ Reliable real-time control ■ Controls are programmable via a network ■ Network stations can be switched on and off during operation ■ Network stations can be restored automatically
BNI network blocks for Ethernet/IP 	**For high system performance** High efficiency is only feasible with an optimized network. We offer a comprehensive Ethernet/IP line of products for your high-performance system. Ethernet/IP is a worldwide recognized standard for network technology and has replaced Devicenet in many areas. The technology based on Ethernet is significantly faster and enables the integration of drive technology. Our Ethernet/IP modules also score points with their high operator-friendliness.	**Features** ■ Time- and cost-saving: fast installation and simple integration into existing networks ■ Easy module replacement through innovative address plug ■ Lock and protect IP addresses for greater security and simpler maintenance
BNI network blocks for Devicenet 	**Optimal components for efficient Devicenet use** Balluff offers the entire range of high-performance networking technology. We can provide all modules required for efficient Devicenet applications in the US. Regardless of the controller manufacturer, you can choose from our portfolio based on your needs and utilize a comprehensive and sophisticated networking and connectivity program. You can thus choose an efficient field and process combination and save both time and money.	**Features** ■ Simple installation, fast integration, fast modification ■ Any controller manufacturer
BNI network blocks for EtherCAT 	**Powerful technology for full flexibility** EtherCAT provides full flexibility: from free topology selection to the possibility of connecting and disconnecting devices and segments during operation, to the performance redundancy of the ring topology. The technology is suitable for both centralized and decentralized architectures. It supports master/slave, master/master and slave/slave communication.	**Features** ■ Outstanding performance at low cost ■ Flexible topology and ease of handling ■ Supports up to 65535 slave devices located at up to 100 m from each other ■ International standard since 2007

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PRODUCT OVERVIEW

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Product family		
BNI unmanaged switches 	**Precise detection at any angle and around corners** With our unmanaged switches, 5-port and 8-port Ethernet devices can be star-connected on a component. The unmanaged switches satisfy both protection classes IP67 and IP20 and support the 10 and 100 Mbit/s transfer rates.	**Features** ■ Transfer speed automatically adjustable via Auto-Negotiation function ■ Wiring errors eliminated by Auto-crossing function

System solutions for efficient network design

SWITCHES

Ethernet-based network systems are increasingly significant in industrial automation. To enable you to easily link all Ethernet system components with Ethernet, with Balluff you receive a complete system. We offer you a multiplicity of Ethernet-based systems and network components for machine and system outfitting – for example, Profinet and Ethernet/IP. This means: optimum infrastructure for complex networks.

The most important benefits

- Variety of Ethernet-based systems and network components
- Complete system for linking Ethernet system components with Ethernet

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Reliable signal transmission, even under extreme conditions

I/O BLOCKS

I/O blocks from Balluff connect binary and analog sensors and actuators to the control level via a bus. By using our modules you can significantly reduce the number of cables required. The Balluff I/O blocks also offer additional functions for signal preprocessing and expanded diagnostic options. Various form factors and connection technologies provide solutions for the widest range of requirements, even in extreme environments.

The most important benefits

- Simple to install
- Efficient configuration
- Continuous diagnostics
- Individual solutions through a variety of designs and connection techniques
- Suitable for use under extreme environmental conditions

PRODUCT OVERVIEW

innovating automation

Product family		
BNI IO-Link sensor/actuator hubs 	**For high efficiency – single-channel monitoring detects short circuits and cable breaks** Our IO-Link sensor/actuator hubs in rugged housings are especially efficient additions to your machine installation, particularly in harsh environments. The port-specific single-channel monitoring detects short circuit and overload events as well as a cable break at the port. This degree of selective diagnosis is unique among I/O blocks. Our variant BNI IOL-302… offers the highest functionality with the best flexibility. It combines two blocks into one. Its maximum sensor load current of 500 mA is ideal for operating sensors with high current consumption. If configured as an output, up to 2 A are available at the port.	**Features** ■ Simple and cost-saving installation and maintenance ■ Detects short circuit and overload or cable break at the port ■ Many variations: M8 or M12 connection, 3-pin, 4-pin and analog or configurable, with 8 or 16 standard inputs, IP67 protection ■ Each input programmable as normally open or normally closed – for great flexibility ■ Communicate with IO-Link masters in COM2 mode and provide a complete process image in 2 ms ■ IP20 sensor/actuator hubs for installation in control cabinets, with screw terminals
BNI IO-Link valve interface 	**Simply connect decentralized valve terminals** Our valve interfaces also offer the advantages of IO-Link. Now it is utterly simple to connect decentralized valve terminals and the control level.	**Features** ■ Direct plug-in to the valve terminal ■ Compact adapter housing for minimal space requirement ■ Compatible with pin assignments of various valve terminals ■ Optimized wiring by connection at the control level using standard 3- or 4-wire sensor cable ■ Controls up to 24 solenoids
BNI universal IO-Link interfaces 	**Unlimited possibilities** All devices are open to IO-Link with up to 16 inputs/outputs via the universal IO-Link interface. Connect pumps, signal lights, control panels, valve terminals, switching units, transfer units, etc. to the control level. The module offers the fast IO-Link connection through a standard sensor cable and an open-ended cable.	**Features** ■ Compact adapter housing for direct connection to different devices via IO-Link ■ Universal, fieldbus-neutral ■ Links to the control level using standard sensor cable ■ Variants available with 8 or 16 input/output signals ■ No cumbersome multiple cabling ■ Saves space, time and money through the lean cabling concept

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PRODUCT OVERVIEW

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Product family		
BNI IO-Link memory modules	**Built-in data memory** Many parameters can be logged and saved on our IO-Link memory modules: from the operating data of a tool through the histogram of the temperature level during operation and of the required power level to the number of tool cycles and error messages in the tool. Now you have all the operating data and supplementary information you need for maintenance or repair.	**Features** ■ Log and store many different parameters ■ More efficient maintenance and repair thanks to enhanced information

Important parameters for optimized processes

IO-LINK MEMORY MODULES

Our IO-Link memory modules have a built-in data storage to assume the function of a removable data carrier. Many parameters can be logged and saved on the IO-Link memory module, from the operating data of a tool to a histogram of the temperature level during operation or the required power level to the number of tool cycles and error messages in the tool.

The most important benefits

- Built-in data storage
- Logging and saving many different parameters
- More efficient maintenance/repair, since supplementary information is available

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Efficient communication with no wear

INDUCTIVE COUPLERS

Fixed wiring of sensors and actuators comes with drawbacks: cable and contacts are often severely loaded, and cables can fatigue and break. And in the worst case, machine stoppages are the result. Not so with our inductive couplers. These transmit data and power over an air gap. No mechanical wear occurs.

This increases equipment availability, results in shorter cycle times and makes processes more flexible. This enables you to meet new demands in the shortest possible time, because the units can quickly be disconnected, are easy to handle and maintenance-free.

The most important benefits

- No mechanical wear
- Higher system availability, shorter cycle times, more flexible sequences
- Quickly disconnectable, easy to handle, maintenance free

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PRODUCT OVERVIEW

innovating automation

Product family		
BIC inductive couplers for IO-Link signal transmission 	**Transparent, contactless data exchange between master and device** Our inductive couplers transmit data and power contactlessly across an air gap. This renders mechanical plug-in contacts superfluous. Use our bi-directional version with IO-Link to also send the data in both directions. Non-contact signal transmission over IO-Link is transparent and does not have to be parameterized, so that you can easily and simply incorporate the coupler between the IO-Link master and IO-Link device and start communicating immediately. Events, parameter data and process data are directly exchanged between master and device.	**Features** ■ Simultaneous control of actuators and gathering of sensor signals ■ AUX power for actuators can be switched on and off ■ No configuration needed – simple installation via plug-and-work ■ IO-Link functionality up to the device ■ Flexible process data length

Product family		
BIC inductive couplers for signal transmission 	**Reliably transmit signals in both directions** Our inductive couplers are designed for up to eight sensor signals and eight actuator drive signals. The bidirectional system transmits signals in both directions. Its remote unit can drive on an individual basis and operate clamping units. Up to eight signals can be transferred from the base. Drive four channels independently of each other.	**Features** ■ Send signals in both directions without contact ■ Remote unit drives individually and operates clamping units ■ Transfer up to eight signals ■ Drive four channels independently of each other
BIC inductive couplers for power supply 	**Contactless power transmission guarantees fast format change** Fast gripper changes are critical on robots for high productivity. Plug contacts often make those changes difficult. Our inductive couplers for power supply transmit power contactlessly across an air gap. Mechanical plug contacts are therefore superfluous. This ensures freedom from wear, guarantees prompt tool change and provides great flexibility.	**Features** ■ Wear-free contactless power transmission across an air gap ■ Prompt tool change ■ High flexibility

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Generate, transport, visualize data – create added value

SOFTWARE

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The future of automation is increasingly interlinked and digital. The growing diversity of technology, including in the private sector, means the expectations of many users are increasing while the demands on industry rise.

Meeting these increasing demands necessitates the merging of traditional automation technology (OT) and information technology (IT). The increased use of software is the next logical step.

Balluff offers you a variety of software that, combined with our IIoT capable hardware, represents true added value.

Your Balluff solutions

- Configuring and operating IO-Link devices

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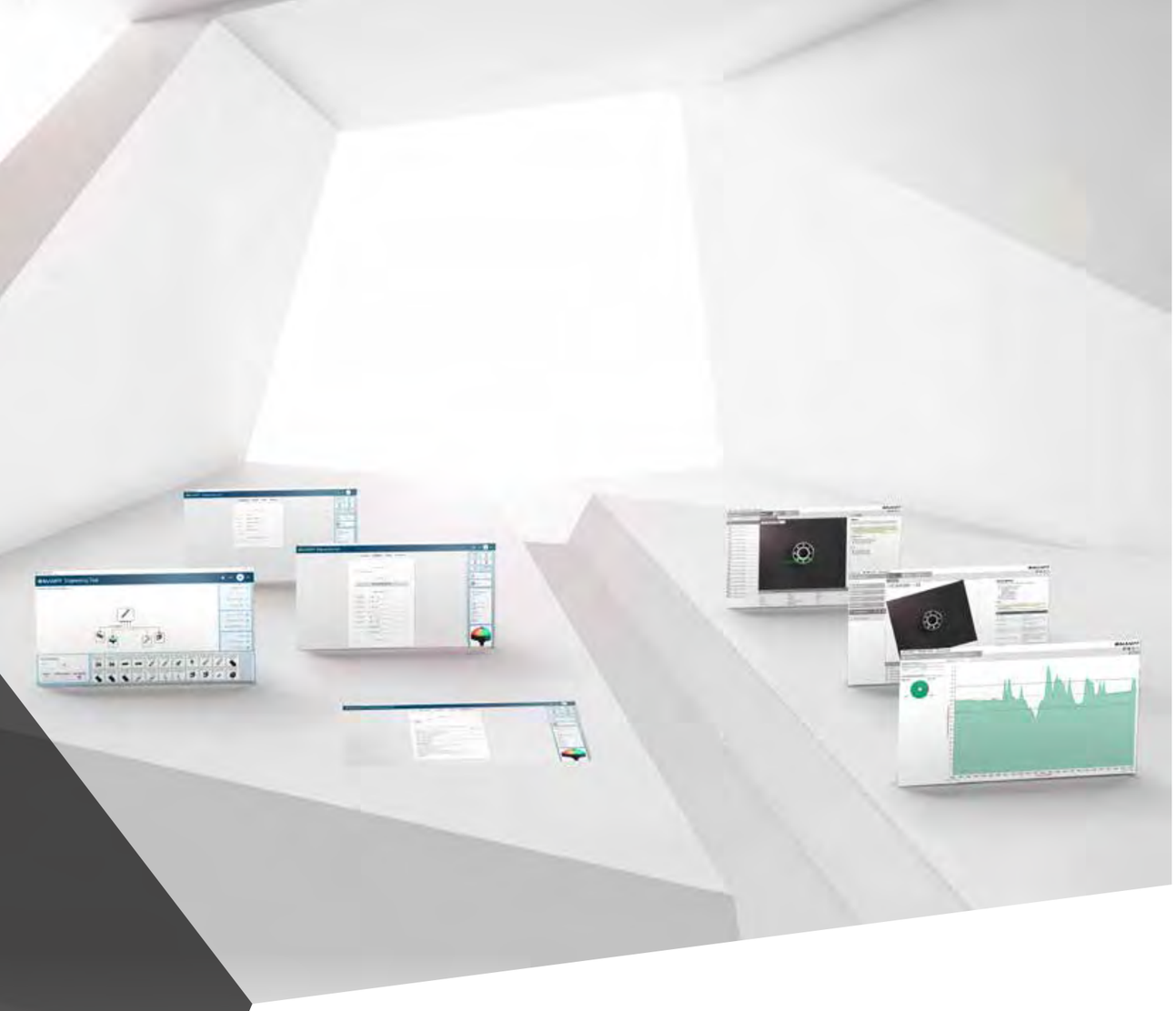

Simpler operation and greater transparency using software tools

SOFTWARE FOR COMMISSIONING AND CONFIGURATION

At Balluff you can choose software for commissioning and configuration for IO-Link capable sensors and for camera and RFID systems.

This greatly simplifies parameter setting and commissioning. You can even configure parameters on-the-fly.

The most important benefits

- Configuring and operating IO-Link devicesn
- Configuration and commissioning for camera systems

PRODUCT OVERVIEW

innovating automation

Product family		
Configuring and operating IO-Link devices	**Balluff Engineering Tool** The Balluff Engineering Tool (BET) makes simple configuration and startup of IO-Link devices available. You can conveniently configure and put into service each device based on the IO-Link standard for sensors and actuators from a PC or tablet. No more having to deal with a complicated software tool landscape.	**Features** ■ Simple, faster setup of IO-Link devices, even without a PLC ■ Reduced startup time and fewer errors since IO-Link device settings can be saved and reused ■ Prevents wiring mistakes and reduces time-consuming PLC programming troubleshooting by testing the IO-Link wiring before startup ■ Faster error detection: Compare the IO-Link topology with the existing one ■ Greater efficiency: Unique software for all IO-Link network and I/O blocks as well as IO-Link sensors and actuators

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Holistic automation solutions for your production environment

SYSTEM-SOLUTIONS

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We offer our customers IIoT capable hard- and middleware in combination with powerful software. This means you benefit from system solutions for the widest variety of requirements in your production environment.

You get solutions for condition monitoring of your machines, for monitoring your production equipment or systems for tool management on injection molding machines or machine tools.

Your Balluff solutions

- Tool ID
- Connected Mold-ID

Collect tool data with RFID

TOOL MANAGEMENT

Tool management is indispensable for reliable automation processes, whether on machine tools or injection molding machinery. With Balluff you benefit from more than 30 years of tool management experience.

Not only that our low-frequency RFID system has established itself as the standard over many years and that we also offer high-frequency versions. Our solutions even offer the option of mixed frequencies in one unit. Backed by our decades of Industrial RFID expertise.

Our systems provide you with reliably complete tool data, and support secure operation to increase the productivity of your plant.

Balluff plug-and-play solutions make it easy for you to enter the world of digital tool management. And they are easy to retrofit into existing machines. All is well that starts easy.

PRODUKTÜBERSICHT

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Produktfamilie		
Tool ID 	**Your solution for the machine tool** Tool-ID is the economical entry solution for tool management. The simplified installation and configuration allows any machine tool to be easily retrofitted with just a USB port (keyboard extension). RFID technology is used to write the data from the presetter (required) to the tool. And then transmit the data to the machine tool using the Easy Tool-ID system. Manual entry is eliminated. Setup times and the risk of incorrect are significantly reduced.	**Features** ■ Reduce setup times and input mistakes: Send tool data reliably and fast via USB ■ Reduces defect rate: No manual entering of tool data ■ Effortless retrofitting: Simple configuration via web browser, no intervention in the machine tool itself and only very short downtimes
Connected Mold-ID 	**Your solution for injection molding machines** Optimize the use of your injection molds. And enable condition-based maintenance. Connected Mold-ID makes entry into digital tool management easy. Because with plug-and-play you can collect and manage your injection mold automatically. Connected Mold-ID enables optimal utilization of your molds and high availability. This prevents mold failures and reduces unplanned downtimes.	**Features** ■ No downtimes from tool failures ■ Documentation of the tool life cycle and recording of the production cycles using an autonomous system ■ High data security, no information loss: All the data are available directly on the tool ■ Optimal tool changes by visualizing inspection intervals on the equipment and in the software

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Wide range of voltages and power levels

POWER SUPPLY.

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With our power supplies you can power any of your applications. Whether single-phase, three-phase, for parallel or series wiring, whether for the control cabinet, in compact form for automated machines or for harsh conditions directly in the field. At Balluff you will find a wide selection of voltages and power levels for reliable and efficient power supply, for example, our Heartbeat® power supply units, which enable intelligent solutions with predictive maintenance. The expanded diagnosis is usable system-wide via IO-Link. Our devices are approved according to CE/TÜV, UL or CCC.

Your Balluff solutions

- Power supply units

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Reliable and efficient power supply

POWER SUPPLY UNITS

Balluff offers high-performance power supplies to ensure that your systems run efficiently and without interference. Our DIN Rail mount power supplies withstand overload and have especially long service life: up to 800,000 hours (91 years) to ensure the availability of your machines and equipment.

Our power supplies with the Heartbeat® function provide continuous function information about the internal device condition and indicate the current load situation and demand on the internal components. And the Lifetime display gives you warning for preventive maintenance. The diagnostics function can be applied anywhere in the system via IO-Link.

All the devices are available in several versions and output voltages. Heartbeat® power supply units for use directly in harsh environments are also available in IP67.

The most important benefits

- Complete line – everything from a single source
- Safety in case of short circuits and overloads in industrial environments
- Long service life for reliable operation
- High system availability of all equipment
- Comprehensive approval packages for global use

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PRODUCT OVERVIEW

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Product family		
BAE Heartbeat® power supply units 	**Optimal power supply for efficient automation** Our Heartbeat® power supply units ensure reliable and efficient power supply of sensors, actuators, controllers and HMIs. They are distinguished by especially high-quality components, long service life and integrated monitoring. Another plus: the three-color status LED on the Heartbeat® power supply tells you the current load situation, device level of wear as well as the remaining service life of the power supply at a glance.	**Features** ■ 24 V, single phase ■ 60, 120, 240 and 480 W ■ Short-circuit proof with PowerBoost 150 % ■ Regulatable output voltage ■ Especially low residual ripple on the output voltage ■ Heartbeat® supports preventive maintenance and condition-based maintenance (Industry 4.0)

Product family		
BAE Heartbeat® power supply units with IO-Link interface 	**For demanding applications and preventive maintenance** Reliably handle critical applications with high demands on quality, long service life and diagnostics capability. Balluff also offers Heartbeat® power supply units with IO-Link. Alarm, stress level and lifetime are output through the digital outputs. Using IO-Link you can call up detailed diagnostic and status information about the device, the operating parameters and history.	**Features** ■ 24 V, single phase ■ 60, 120, 240 and 480 W ■ Short-circuit proof with PowerBoost 150 % ■ Regulatable output voltage ■ Especially low residual ripple on the output voltage ■ Heartbeat® supports predictive maintenance and condition-based maintenance, communicating to host systems over IO-Link ■ Extra-narrow IP20 versions for the resource-optimized control cabinet ■ IP67 versions for power in decentralized structures directly at the consumer
BAE power supplies 	**Reliable power supply for installation in the control cabinet** Our DIN rail mount power supplies are ideal for virtually any application, since they offer different power levels. Our short-circuit-proof power supplies for automation are approved for worldwide use. Different voltages of 24 V, 12 V up to 48 V can be selected. Diagnostic outputs are available for incorporation in machine diagnostics.	**Features** ■ Single-phase or three-phase ■ 18…960 W, connected in parallel up to 2.8 kW ■ Regulatable output voltage ■ Ready-/Alarm-LED and output (digital) ■ Parallel and series operation for flexible adaptation to the application (type-dependent) ■ Also available as a Class 2 version ■ Especially low residual ripple on the output voltage ■ Forward or hiccup mode in the event of a short circuit ■ Metal or metal/plastic housing

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Standardized and tailor-made connection components

CONNECTIVITY.

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For all areas of automation, Balluff offers an extensive selection of connectivity elements for nearly all networks, with a variety of materials for use anywhere in the world. We do this so that you have reliable solutions for your applications.

Our connectors and double-ended cordsets are available for high temperatures up to 180 °C and for low temperatures down to –40 °C. Designs with Ecolab approval or in IP69K are especially suitable for sensitive conditions such as the food industry. All connectivity technology is ideally suited for rugged use in the industrial environment. Whatever you decide on, simple installation and rapid integration for fast start-up are guaranteed.

Your Balluff solutions

- Single-ended cordsets
- Double-ended cordsets
- Field attachables
- Junction blocks
- Receptacles
- Bulk cables
- Y-Splitters
- Tees
- Bulkheads
- Adapters
- Terminating resistors

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Large selection for every industry

SINGLE-ENDED CORDSETS

In our comprehensive product range of single-ended cordsets for every industry, you can find the right connection for your application. Signals, data and power are always reliably transmitted. We also offer various cable types and connectors for great flexibility in making your selection.

The most important benefits

- Large selection for every industry
- Various cable types, various plug connectors
- Robust and industrial grade

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PRODUCT OVERVIEW

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Product family		
BCC single-ended cordsets for individual requirements 	**High performance at high temperatures** Our offering of single-ended cordsets covers a wide range of technical areas, to meet your individual requirements. The single-ended cordsets with coated retainer nuts and special plug materials withstand temperatures of up to 800 °C for brief periods. This also makes them suitable for use in harsh industrial environments. The mechanical protection of the lines guarantees secure connection even in the presence of flying sparks and weld spatter, and when subject to mechanical wear and impacts.	**Features** ■ Suitable for high temperatures (up to 800 °C for brief periods) ■ Protection against mechanical influences, flying sparks and weld spatter ■ Coated retainer nuts ■ Special plug materials
BCC single-ended cordsets for the food industry 	**High-quality single-ended cordsets optimized for the food industry** Our single-ended cordsets are exceptionally well-suited for the requirements of the food industry. This is because they were intensively tested and optimized for the highest demands. They are best matched to our sensors and systems used in the food industry.	**Features** ■ Best suited for use in the food and beverage sector ■ Straight and angled connectors ■ Various cable jacket materials ■ Proven PUR cable qualities ■ Protection type IP69K ■ Stainless steel nuts ■ For high hygiene requirements
BCC single-ended cordsets for junction blocks 	**Wide product range for high flexibility of application** At Balluff you find the right single-ended cordsets for junction blocks in M12 and M23. 8-, 12- or 19-pin versions are available, with PUR or PVC cables and angled or straight plugs. All lines are resistant to shocks and vibration, conform to the protection type IP67 and are made of high-quality materials.	**Features** ■ Resistant to shocks and vibration ■ High-quality materials ■ Protection class IP67

Product family		
BCC power single-ended cordsets 	**7/8" power cables for Profinet modules** Balluff offers you a wide product range of 7/8" power single-ended cordsets for push-pull connections. You have the choice between cables with 3-, 4- or 5-conductors, versions in PUR, PVC or TPE, and with right-angle or straight plugs. All power single-ended cordsets are resistant to shocks and vibration, conform to the protection type IP67, are made of high-quality materials and are flexible in application.	**Features** ■ Resistant to shocks and vibration ■ High-quality materials ■ Protection class IP67
BCC plug connectors for Profinet push-pull modules 	**For optimized data transmission** Our single-ended cordsets for the new push-pull variants of the Profinet modules are especially fast and easy to assemble. For your data transmission you can choose between copper conductors and single-ended cordsets for glass and plastic fiber optics. All available single-ended cordsets deliver convincing performance with a large transmission bandwidth and a high length range. In this way, your data-intensive applications from power supply to data transmission are optimized.	**Features** ■ Wide transmission bandwidth ■ High longitudinal range ■ Resistant to shocks and vibration ■ Protection class IP67 ■ Fast and easy mounting
BCC single-ended cordsets for sensors 	**Wide, versatile product range for connecting your sensors** Our single-ended cordsets for sensors are especially designed for M5, M8 and M12 connectors and are suitable for 3-, 4-, 5- and 8-conductor cables. Whether PUR, PVC, or TPE, with or without LED, angled or straight, our wide product range offers great flexibility for your applications. All single-ended cordsets are resistant to shocks and vibration, are made of high-quality materials, have bright LEDs if included and conform to the protection type IP67 (optionally IP68).	**Features** ■ PUR, PVC and TPE cable ■ Versions with and without LEDs ■ Angled and straight versions ■ With socket and plug ■ Resistant to shocks and vibration ■ High-quality materials ■ Bright LEDs ■ Protection type IP67, optional IP68
BCC valve connector single-ended cordsets 	**Easy assembly for secure connection** Our valve connector single-ended cordsets can be mounted especially quickly via their central screw. Our large product range includes various designs, DIN and industry standard, and various protective circuits. All our single-ended cordsets are resistant to shocks and vibration, are made of high quality materials and have bright LEDs. A sealing lip is integrated.	**Features** ■ Different protective circuits ■ Designs A, B and C ■ DIN and industry standard available ■ Resistant to shocks and vibration ■ High-quality materials ■ Bright LEDs ■ Fast installation with one central screw ■ Integrated sealing lip

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Reliable transmission of signals, data and power

DOUBLE-ENDED CORDSETS

With our robust double-ended cordsets, signals, data and power are transmitted continuously and securely, in every industry and in every application. At Balluff you can choose from various cable types and connectors.

The most important benefits

- Always the right connection for your application
- Various cable types, various plug connectors
- Reliably transmit signals, data and power
- Robust and industrial grade

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PRODUCT OVERVIEW

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Product family		
BCC fieldbus double-ended cordsets 	**Certified bus cables for common fieldbus systems** At Balluff you will find certified fieldbus double-ended cordsets for connecting to all common fieldbus systems such as Profibus, Profinet, Devicenet, Ethernet or CC-Link. For maximum flexibility, we offer injection-molded and assembled plugs, as well as straight and angled plug connectors. Various cable sheathing materials and drag-chain compatible versions round out our extensive product range.	**Features** ■ Certified bus lines ■ Suitable for all standard commercially available fieldbus systems ■ Injection-molded and assembled plugs ■ Straight and angled connectors ■ Various cable jacket materials ■ Cable-carrier-suitable versions
BCC double-ended cordsets for individual requirements 	**Specially developed for high temperatures and hard environments** In our wide portfolio of double-ended cordsets, you will certainly find the right product for your individual requirements. Our double-ended cordsets are protected against mechanical wear and withstand shock and short-term temperatures up to 800 °C. Flying sparks and metal spatter such as in welding applications are no problem for them.	**Features** ■ Best suited for welding applications ■ Reliable also at high temperatures (up to 800° for brief periods), when there are flying sparks and metal spatter ■ Rugged resistance to mechanical effects, wear and impacts ■ Coated retainer nuts ■ Special plug materials
BCC double-ended cordsets for the food industry 	**High-quality double-ended cordsets – optimized for the food industry** Our double-ended cordsets are exceptionally well-suited for the requirements of the food industry. This is because they were intensively tested and optimized for the highest demands. Thus, they are best matched to our sensors and systems used in the food industry.	**Features** ■ Best suited for use in the food and beverage sector ■ Straight and angled connectors available ■ Various cable jacket materials available ■ Protection class IP69K ■ Stainless steel nuts ■ For high hygiene requirements

Product family		
BCC double-ended cordsets for junction blocks 	**Robust lines in different versions** Our PUR- and PVC-double-ended cordsets for junction blocks are suitable for M12 and M23 plugs in 8-, 12- or 19-pin versions. We offer angled and straight variants. They are all shock-resistant and vibration-resistant, are made of high-quality materials and conform to protection type IP67.	**Features** ■ 8-, 12-, 19-pin ■ PUR and PVC ■ Angled and straight variants ■ Resistant to shocks and vibration ■ High-quality materials ■ Protection class IP67
BCC power double-ended cordsets 	**Extra power for 7/8"- and push-pull connections** We have a wide product range of power double-ended cordsets 7/8" and push-pull connections. You can select from among 3-, 4- and 5-conductor PUR, PVC and TPE cables in angled or straight versions. Another benefit: All power double-ended cordsets are shock-resistant and vibration-resistant, are made of high-quality materials and conform to protection type IP67.	**Features** ■ Suitable for 7/8"- and push-pull connections ■ 3-, 4- or 5-wire ■ PUR, PVC and TPE lines available ■ Right-angled and straight versions ■ Resistant to shocks and vibration ■ High-quality materials ■ Protection class IP67
BCC double-ended cordsets for Profinet configurable blocks 	**Wide transmission bandwidth and length range** Double-ended cordsets for Profinet push-pull blocks are especially fast and easy to install. For data transmission you can choose between copper cables or glass/fiber optics cables. All double-ended cordsets deliver convincing performance with a large transmission bandwidth and a high longitudinal range. Optimize your data-intensive applications, from power feed to data transmission.	**Features** ■ Wide transmission bandwidth ■ High longitudinal range ■ Resistant to shocks and vibration ■ Protection class IP67 ■ Fast and easy mounting
BCC double-ended cordsets for sensors 	**Robust cables in various configurations** For connecting sensors, double-ended cordsets are available in M5, M8 and M12. Also choose from 3-, 4-, 5- and 8-conductor cables. Cables come with or without LED and in straight or right-angle versions. Good to know: all our double-ended cordsets are resistant to shock and vibration, are made of high-quality materials, and conform to the protection type IP67 (optionally IP68).	**Features** ■ Right-angled and straight versions ■ Resistant to shocks and vibration ■ High-quality materials ■ Versions with and without LEDs ■ Protection type IP67, optional IP68
BCC valve connector double-ended cordsets 	**Quick to install, rugged cables for secure connection** Balluff offers you a wide product range of double-ended cordsets with different protection circuits for valve connectors. We carry types A, B and C, each with either M12 or M8 plug connectors. Our valve connector double-ended cordsets are shock-resistant and vibration-resistant, made of high-quality materials and have bright LEDs. They can be quickly mounted using the center screw.	**Features** ■ Different protective circuits ■ DIN and industry standard ■ Resistant to shocks and vibration ■ High-quality materials ■ Fast installation with one central screw ■ Integrated sealing lip

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Reliably transmit signals, data and power without cable

FIELD ATTACHABLES

Balluff offers you an extensive product range of field attachables for the secure transmission of signals, data and power. From various designs and housing materials, you can select exactly the product that fits your application. All plug connectors are extremely robust and industrial grade.

The most important benefits

- Large selection for every industry
- Various designs
- Various housing materials
- Secure transmission of signals, data and power
- Robust and industrial grade

PRODUCT OVERVIEW

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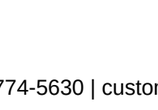
Product family		
BCC field attachables 	**The right connector for every industry** Our field attachables are available in various form factors and housing materials and always in the quality you are accustomed to and expect from us. Our wide product range can be used in every industry.	**Features** **7/8" plug connectors** ■ Plastic versions ■ Straight and angled connectors ■ Female or male ■ 3-, 4-, 5-pin ■ Protection class IP67 ■ Resistant to shocks and vibration **Plug connectors for field buses** ■ For all common fieldbus systems: Profibus, Profinet, Devicenet, Ethernet, CC-Link ■ Straight and angled connectors ■ Female or male ■ Plastic and metal versions **Plug connectors for the food industry** ■ Optimized for use in the food and beverage sector ■ Straight or angled connectors ■ Female or male ■ Protection type IP69K ■ Stainless steel nuts ■ Ensured hygiene **M8 and M12 plug connectors** ■ 3-, 4-, 5-, 8- and 12-pin ■ With socket, plug ■ Straight and angled connectors ■ Plastic and metal versions ■ Various connection methodologies ■ Resistant to shocks and vibration ■ Protection class IP67 **Plug connectors for junction blocks** ■ For M12 and M23 plug connectors ■ 8-, 12-, 19-pin ■ Straight and angled connectors ■ Female or male ■ Resistant to shocks and vibration ■ Protection class IP67

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Universal use, even under harsh conditions

JUNCTION BLOCKS

Junction blocks from Balluff connect sensors and actuators to the controller. These are ideal for harsh environments, especially in areas subject to coolants and lubricants. Metal screw inserts ensure optimum media resistance. The fully encapsulated housing offers a high degree of protection and an outstanding resistance to shock and vibrations.

The most important benefits

- Easy connections
- Low space requirements
- High media resistance and precision fit with metal screw inserts
- Flexible mounting options

PRODUCT OVERVIEW

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Product family		
BPI junction blocks 	**Industry compatibility guaranteed** Junction blocks from Balluff are vibration- and shock-resistant and can be attached to all standard profiles and base plates. The mounting holes are placed in the center. Additional mounting holes on the side allow flexibility in mounting. The rugged design and metal screw inserts mean you can integrate our junction blocks accurately into any machine or system.	**Features** **M12 port plug connection** ■ Connection with 12-pin and 19-pin M23 plug connector ■ Variants for one or two signals per port ■ 4-way and 8-way versions of PNP, NPN and variants without LED available **M12 port cable connection** ■ Various cable lengths ■ Variants for one or two signals per port ■ 4- and 8-way versions ■ Variants for PNP and NPN sensors and variants without LED **M12 port hood-type outlet** ■ Connection via plug strips ■ Galvanic isolation of the power supply for the sensors and actuators via jumpers possible ■ Variants for one or two signals per port ■ 4- and 8-way versions ■ Variants for PNP sensors **M8 port cable connection** ■ Various cable lengths ■ Variants for one or two signals per port ■ 4-, 6-, 8-,10-way versions ■ Variants for PNP and NPN sensors and variants without LED **M8 port plug connection** ■ Connection with 8-pin or 12-pin M12 plug connector ■ Variants for one or two signals per port ■ 4-, 6-, 8-,10-way versions ■ Variants for PNP and NPN sensors and variants without LED

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PRODUCT OVERVIEW

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Product family		
BCC receptacles 	**Robust receptacles for a secure connection** Our wide range of receptacles enables the right solution for every situation.	**Features** ■ With socket and plug ■ Robust metal designs ■ Resistant to shocks and vibration ■ High-quality materials ■ Protection class IP67 ■ Different strand lengths available ■ Versatile application

Rugged for secure connections

RECEPTACLES

With Balluff you can select from a wide, flexibly applicable product range of receptacles in M8 and M12 sizes. You can get the connectors in 3-, 4-, 5-, 8- and 12-pin versions.

Made of tough metal, all receptacles offer IP67 protection. They are also shock- and vibration-resistant.

The most important benefits

- With socket and plug
- Robust metal designs
- Resistant to shocks and vibration
- High-quality materials
- Protection class IP67
- Different strand lengths available
- Wide range of products
- Flexible in application

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Proven quality and the best suitability for industry

BULK CABLES

Balluff offers you bulk cables with the proven quality of our assembled cables. The bulk cables product range includes different materials with different cross-sections. Therefore, you can find the correct line for your application and in any case a robust and industrial grade solution. You also profit with each of our cables from great installation flexibility, since the cable length can be adapted as needed.

The most important benefits

- Proven quality of our assembled cables
- Various materials and cross-sections available
- Robust and industrial grade
- Line length freely adaptable

PRODUCT OVERVIEW

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Product family		
BCC bulk cables for individual requirements 	**Very robust at high temperatures** With an especially wide product range of rugged bulk cables, Balluff will meet your individual requirements. Our bulk cables are best suited for use in welding applications because they tolerate high temperatures, even up to 800 °C for brief periods. Even flying sparks and metal spatter cannot harm them. They remain unaffected by mechanical wear and shock. This ruggedness means they have extremely long service life.	**Features** ■ Especially wide product range ■ Best suited for welding applications ■ Robust resistance to high temperatures (up to 800 °C for brief periods) ■ Protected against mechanical influences, flying sparks and metal spatter, mechanical wear and impacts
BCC bulk cables for junction blocks 	**Wide product range for M12 splitters** With Balluff you can choose from a wide product range of PUR and PVS bulk cables for junction blocks. This includes hybrid cables in different versions and bulk cables with different numbers of wire strands. These bulk cables are suitable for junction blocks in the M12 size.	**Features** ■ PUR and PVS cables ■ Different numbers of wire strands ■ Suitable for M12 splitters ■ Wide range of products ■ Versatile
BCC cables for sensors 	**Wide product range for the right connection** Select your PUR and PVC cables from our wide range. Especially the American market, TPE cables are also available to you. All our cables are available in 3-, 4- and 5-wire versions and are made of exceptionally high-quality materials.	**Features** ■ 3-, 4- and 5-wire ■ PUR, PVC and TPE ■ High-quality materials ■ Wide range of products ■ Versatile

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Robust splitters for rapid, reliable connections

Y-SPLITTERS

With our Y-splitters, you can collect, connect and split two signals in the field. Our comprehensive program offers robust and industrial-grade Y-splitters with various designs. All splitters ensure a rapid and reliable connection.

The most important benefits

- Connect a variety of cables
- Comprehensive product range
- Various designs
- Reliable and rapid connection
- High dust and water protection
- Robust and industrial grade

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PRODUCT OVERVIEW

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Product family		
BCC Y-splitters for the food industry 	**High quality Y-splitters optimized for the food industry** Our Y-splitters for the food industry easily meet the high demands for food and beverage. They have been thoroughly tested, optimized for the highest requirements and ideally matched to our sensors and systems used in the food industry.	**Features** ■ Perfectly designed for use in food and beverage ■ Straight and angled connectors available ■ Various cable jacket materials available ■ Protection type IP69K ■ Stainless steel nuts ■ Ensured hygiene

Product family		
BCC Y-splitters for sensors 	**Use rugged sensor splitters for connection and signal splitting** For the secure connection of sensors, we offer you a comprehensive product range of Y-splitters. Our wide, flexibly applicable product portfolio includes Y-splitters for sensors with M8 and M12 connections that are suitable for 3, 4 and 5-wire and other cables. The shock-resistant an vibration-resistant splitters are made of high-quality materials and can be equipped with bright LEDs. All Balluff Y-splitters conform to protection type IP67 (optionally IP68).	**Features** ■ PUR, PVC and TPE lines available ■ Variants with and without LEDs available ■ Right-angle or straight version available ■ With socket, plug ■ Resistant to shocks and vibration ■ High-quality materials ■ Bright LEDs ■ Protection type IP67, optional IP68 ■ Wide range of products ■ Versatile
BCC Y-splitters with valve connector 	**Quickly assembled and usable even under harsh conditions** Balluff offers you a comprehensive product range of Y-splitters with valve connectors with various designs and different protective circuits. The shock- and vibration-resistant Y-splitters from Balluff are available with DIN and industry standard. Using the central screw, they are mounted especially quickly. In their production, we use exclusively high quality materials.	**Features** ■ Designs A, B and C ■ Different protective circuits ■ DIN and industry standard ■ Resistant to shocks and vibration ■ High-quality materials ■ Bright LEDs ■ Rapid assembly via central screw ■ Integrated sealing lip

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PRODUCT OVERVIEW

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Product family		
BCC Tees	**Splitters without wires ensure secure connection** You can use tees to collect, connect and split two signals. These are distinguished by their small, narrow and compact design and are available in different physical forms. We offer tees with M8, M12 and 7/8" connections that are suitable for 3-, 4- and 5-wire cables. Chose from different protection circuits and variants without, with one or with two mounting holes.	**Features** ■ Small, narrow and compact ■ Extensive product range with various designs ■ For reliable, fast connecting ■ Robust and industrial grade ■ Resistant to shocks and vibration ■ Protection type IP67, optional IP68 ■ High-quality materials ■ Bright LEDs ■ Flexibly applicable – various wirings, variants without, with one or with two mounting holes

Splitters without wires ensure secure connection

TEES

For reliable gathering, connecting and distributing of two signals Balluff provides a wide range of tees. Our solutions are distinguished by their small, narrow and compact design and are available in different form factors.

Various protection circuits and mounting holes offer you great flexibility in utilization.

The most important benefits

- Small, narrow and compact
- Extensive product range with various designs
- For reliable, fast connecting
- Robust and industrial grade
- Resistant to shocks and vibration
- Protection type IP67, optional IP68
- High-quality materials
- Bright LEDs
- Flexibly applicable – various wirings, variants without, with one or with two mounting holes

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PRODUCT OVERVIEW

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Product family		
BCC bulkheads 	**Robust plug connectors for optimized connection** Our connectors ensure a reliable and rapid connection through the control cabinet wall or other housings. For versatility, various form factors are available. Our connectors also feature high-quality materials as well as dust and water protection. The RJ45 and M12 versions (A-, B- and D-coded) are shock and vibration resistant as well as extremely rugged.	**Features** ■ High dust and water protection ■ Extensive product range with various designs ■ For reliable, fast connecting ■ Robust and industrial grade ■ High-quality materials

Robust plug connectors for optimized connection

BULKHEADS

We offer you an extensive product range of bulkheads. Our RJ45 and M12 plug connectors (A-, B- and D-coded) in various designs are exceptionally robust, resistant to shocks and vibration.

High dust and water protection and high-quality materials distinguish connectors from Balluff. They ensure a reliable and rapid connection through the control cabinet wall or other housings.

The most important benefits

- High dust and water protection
- Extensive product range with various designs
- For reliable, fast connecting
- Robust and industrial grade
- High-quality materials

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PRODUCT OVERVIEW

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Product family		
BCC adapters 	**M8, M12 and valve connector adapters** Our M8 and M12 adapters as well as our valve connector adapters meet the highest requirements while offering additional flexibility for implementing your applications with minimal effort. ■ Resistant to shocks and vibration ■ High-quality materials ■ IP67 **Profibus adapters** Our Profibus adapters are available for easy and secure Profibus connection. ■ Completely shielded zinc die-cast housing ■ Switch lever for the activation of the bus termination remotely operable ■ Programming/diagnostic option with second D-sub ■ Various housing shapes ■ Versions with plug-and-play and field attachables	**Features** ■ Robust, industrial grade ■ For reliable, fast connecting ■ Additional flexibility

Problem solvers in installation technology

ADAPTERS

The extensive range of adapters from Balluff helps you to connect different plug connector designs quickly and reliably.

For the highest degree of flexibility you can select from various product series. Without exception these are extremely rugged, designed for industrial conditions.

The most important benefits

- Robust, industrial grade
- For reliable, fast connecting
- Additional flexibility

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PRODUCT OVERVIEW

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Product family		
BCC terminating resistors	**Robust plug connectors for optimized connections** We sell terminating resistors for all standard commercial bus systems – Profibus, Devicenet and CC-Link. You get standardized as well as custom connection components and can choose from various form factors. This expands your options in installation and application. All products are well suited for rugged use in the industrial environment. Rugged, noise-resistant and extremely reliable, they contribute to the high production quality of your systems.	**Features** ■ Robust, interference resistant ■ Resistant to shocks and vibration ■ Industrial grade ■ IP67, optionally IP68 ■ High-quality materials ■ Reliable ■ Various designs ■ Suitable for all standard commercially available field bus systems ■ Supports high manufacturing quality

Matched to your bus system

TERMINATING RESISTORS

At Balluff you will always find the right terminating resistor. This is because we offer terminating resistors for all standard commercial bus systems – Profibus, Devicenet and CC-Link. Our broad product range includes both standard and custom components. They are available in various form factors and in molded versions.

The most important benefits

- Robust, interference resistant
- Resistant to shocks and vibration
- Industrial grade
- IP67, optionally IP68
- High-quality materials
- Reliable
- Various designs
- Suitable for all standard commercially available field bus systems
- Supports high manufacturing quality

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High-quality gear for virtually any application

ACCESSORIES.

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Our great selection of high-quality accessories supports you in the optimum embedding of the sensor in machines and systems through easy assembly and installation, exact positioning and high machine availability. The wide Balluff product range offers the optimum gear for nearly every application.

Your Balluff solutions

- Fastening technology
- Mechanical protection
- Reflectors, fibers, optics
- Lights for vision systems and machines
- Signal converters and communication adapters

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Versatile and flexible mounting solutions

FASTENING TECHNOLOGY

With our assembly systems and brackets, you can adapt the sensors and equipment to your particular task.

Simple to install and adjust, these provide easy attachment and exact positioning, even under difficult conditions. Balluff mounting solutions are distinguished by high-quality materials and exact processing.

The most important benefits

- Flexible and versatile
- Compatible and universal
- Excellent price/performance ratio

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PRODUCT OVERVIEW

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Product family		
BAM mounts with positive stop for proximity switches 	**Secure protection, positioning and attachment in one** Our proximity sensor mounts with positive stops offer reliable protection, precise positioning and attachment in one. They feature rugged construction and are simple to install. Different sizes from M5 to M30 and different versions, such as steel and stainless steel, are available for selection.	**Features** ■ Economical and reliable ■ Assembly and protection combined ■ Sensor replacement fast and easy with fixed stop without readjustment ■ Flush and non-flush versions ■ Also tool-free versions
BAM universal brackets 	**Precise universal brackets for any application** Our universal brackets can be combined with the BMS assembly system. You can select from cylindrical (M8 to M36) and block-style form factors in many different sizes and made of various materials. These include versions in stainless steel, zinc plated steel, anodized aluminum or wear- and oil-resistant plastic. The high-quality universal brackets are designed and tested for Balluff. They are distinguished by precision and long service life.	**Features** ■ Fast and easy to use ■ Flexible and application-appropriate in use ■ Optimal price/performance ratio
BAM flexible mounting system 	**Individually configurable assembly system** Our flexible mounting system is robust, universally employed and easy to install. It is made of a base bracket, assembly rods, cross ties and linkage pieces. Depending on what you want to attach, you can select from a broad range of suitable sensor and reflector brackets in order to find the right solution. The flexible mounting system is available in various versions (anodized aluminum, chromated zinc, stainless steel or high-quality plastic).	**Features** ■ Long-lasting and economical ■ Simple to install ■ Individually configurable and adjustable ■ Also available as a set and in its case ■ Assembly on baseplates and all standard profiles

Product family		
BAM nuts 	**For the precise and secure installation of sensors** Our rugged nuts have long proven themselves as the standard fastening method for sensors. They are suitable for all common cylindrical designs, provide you with high quality at the best price and ensure that you can integrate sensors into your equipment easily, precisely and safely. The nuts are available in nickel-plated brass, stainless steel or plastic.	**Features** ■ Economical and yet high-quality standard mounting option ■ For M5, M8, M12, M18 and M30 cylindrical sensors ■ Made of stainless steel, metal or plastic ■ Can also be used as replacement parts
BAM brackets for vision sensors, SmartCameras and lights 	**Perfect positioning, easy installation** For Balluff vision sensors, SmartCameras and lights we offer high-quality brackets and holding systems. These are designed and tested specifically for our machine vision devices so that you can position them ideally in your application. The sensor brackets can be combined with the BMS assembly system. They are distinguished by precision and long service life.	**Features** ■ Designed and tested specifically for Balluff vision sensors, SmartCameras and lights ■ Can be combined with the flexible BMS mounting system ■ Precise, stable and durable ■ For optimal positioning in machine vision applications
BAM brackets for RFID systems 	**Custom tailored for Balluff RFID** Need perfect positioning and secure holding of RFID systems? This is what brackets from Balluff ensure. The rugged constructions are designed and tested for our RFID systems and components. They feature precision and long service life. These high-quality brackets are easy to install. Various versions mean you can integrated them perfectly into your system.	**Features** ■ Simple installation and rugged construction ■ Various versions ■ Precise, durable and rugged ■ Designed and tested for Balluff RFID systems and components
BAM brackets for Human Machine Interfaces 	**Can be combined with the BMS mounting system** The brackets for our SmartLight stack lights, our SmartLight indicators and displays also provide exact positioning along with secure holding. They are quick and easy to install. They also feature rugged construction. These high-quality brackets are designed and tested for Balluff devices. You can combine the brackets for Human Machine Interfaces with the BMS mounting system.	**Features** ■ Flexible positioning and ease of mounting in one accessory ■ Simple installation and rugged construction ■ Can be combined with the flexible BMS mounting system ■ Can be integrated on machine and in assembly lines ■ High-quality, compact brackets, designed for Balluff devices

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Mechanical protection for sensors and devices

MECHANICAL PROTECTION

Our protective caps, protective housings, protective covers, protective tubes and anti-sabotage protection prevent mechanical damage to the sensor or a device.

Select from different versions, even for sophisticated applications.

The most important benefits

- High-quality and long service life
- Simple to install
- Compatibility

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PRODUCT OVERVIEW.

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Product family		
BAM plunger probe solutions 	**Robust assembly for maximum application flexibility** Our plunger probe solutions have a fixed stop and a sturdy design for harsh environments. They are ideally suited for welding devices and punch applications as well as for applications with monitored tool ejection. The complete set consists of sensor, housing and springs. You can choose between different plunger tips, such as round, flat, chiseled and M6 threads, as well as three spring tensions (low, medium, high). In each case, the two-part housing simplifies the maintenance.	**Features** ■ Reliable and long service life, even in dirty environments ■ Sensor is easily replaced for cleaning and maintenance ■ Precise switching point ■ Variety of sizes and shapes for versatility ■ Accessories available for the thread type: flat attachment M4, M6, M8, M10
BAM sabotage protection 	**Security against undesirable production losses** Our protective covers, which are compact as well as sturdy, provide reliable protection against misadjustment and sabotage. Specifically designed for Balluff products and solutions, they simplify installation and mounting for you on M8/M12 plug connectors, fieldbus blocks and vision sensors. You can also choose from various versions. Sabotage protection is available in high-quality plastic as well as aluminum.	**Features** ■ Standard industry solutions for protection against misadjustment and sabotage ■ Easy and economical to integrate into any system ■ Made of high quality materials and customized

Product family		
BAM protective housing 	**All-round safety and security** No one using Balluff sensors and devices in very harsh environments should do without our protective housings. They are resistant to high temperature, chemicals and mechanical effects and can even be used in welding areas. They are made of high-quality materials, offer durable surfaces and protective glass with qualified optical properties. Assembly is really easy. And if you find yourself without a spare part, we can deliver quickly.	**Features** ■ Sturdy, thanks to quality materials, durable surfaces and geometry ■ Can be integrated economically and reliably in any system ■ Resistant to high temperatures, chemicals and mechanical influences
BAM protective caps and port covers 	**Reliably handles high temperatures and chemicals** Our easily installable protective caps and port covers ensure reliable protection in harsh environments. They are available for a wide variety of Balluff products, including M8 to M30 sensors. They are available in metal and plastic versions, also with PTFE coating, and are distinguished by high resistance to temperature and chemicals. Some of them can even be used in welding areas and in the foods industry.	**Features** ■ Robust materials and construction, protection class up to IP69K ■ Can be integrated economically and compactly into any system ■ Metal and plastic versions, also with PTFE coating
BAM protective tubes for cables 	**Customizable cable guard** Our flexible and robust silicone cable guard protects the cable primarily in the welding area. It is distinguished by chemical resistance and handles temperatures of up to 250 °C. Discover different versions, such as protective tubing, protective casing and protective tape, as well as different diameters from 7 to 50 mm are available.	**Features** ■ Long-lasting and economical ■ Easy to install ■ Different diameters ■ Customizable

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High-quality accessories system for optical applications

REFLECTORS, FIBERS AND OPTICS

Our accessories for optical applications include round and square reflectors and reflex films. Moreover, you can obtain plastic and glass fibers as well as shields, lenses, filters and deflecting mirrors.

The optical accessories system is qualified for Balluff sensors and is available in different versions, even for highly demanding applications.

The most important benefits

- High quality and flexible
- Simple to install
- Compatibility

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PRODUCT OVERVIEW

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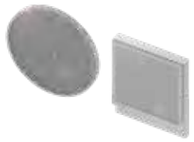
Product family		
BAM reflectors 	**Precise and robust reflectors** The right reflector for any environment: our round and square reflectors and reflective foils are heat- and chemical-resistant. They are suitable for red light, white light, infrared and laser applications. Balluff reflectors and reflective foils realize their full functionality in conjunction with our optoelectronic sensors. For customized use in your application, you can choose between different sizes and mounting options.	**Features** ■ Precise and robust ■ Easy attachment using adhesives or screws ■ Various designs ■ High-quality materials ■ Homogeneous optical properties
BAM optics: diaphragms, filters, lenses, deflectors 	**Robust optics for Balluff sensors and fibers** Our diaphragms, lenses and deflectors are suitable for different optical and ultrasound sensors and applications. The compact and rugged optics are easy to install. To handle any application you can easily select from different size variants and designs, such as plastic, aluminum and stainless steel.	**Features** ■ Designed and tested for Balluff sensors ■ Various lengths and diameters with different focus ■ Precision and homogeneous optical properties ■ High-quality materials and exact processing

Product family		
BFO plastic fibers 	**Plastic optical fibers for optical applications** Our compact, highly flexible and robust plastic fiber solutions are distinguished by precision and speed. They are available as diffuse and through-beam versions. And offer the choice between different head types (M2, M3, M4, M5, M6, square from 5 × 4 mm to 23 × 55 mm etc.) with straight or angled light emission and bendable optic head. The plastic fibers are temperature-resistant and chemical-resistant. You also benefit from simple installation, even under tight installation conditions.	**Features** ■ Designed and tested for Balluff optical fiber devices BFB 6K, 18KF, 73K and 75K ■ Various lengths and diameters ■ Crush-resistant and oil-resistant ■ High function reserve ■ Precise machining and homogeneous optical properties ■ Coaxial fiber arrangement as an option ■ User-fabricated plastic fiber optics available
BFO glass fibers 	**Glass optical fibers for optical applications** Our compact, flexible and robust glass fiber solutions are distinguished by their precision and speed. They are available as switch and through-beam versions. Different end pieces with diameters ranging from 2 to 8 mm are available for selection, as well as a choice between straight or angled designs. The glass fibers are temperature-resistant up to 250 °C and chemically resistant. They are also simple to install, even in tight mounting conditions.	**Features** ■ Designed and tested for Balluff BFB M18M-… and BOS 30M-… ■ Various casing materials, such as polyurethane, corrugated metal tubing and silicone ■ Various lengths and diameters ■ Crush-resistant and oil-resistant ■ High function reserve ■ High quality materials and precise machining ■ Homogeneous optical properties

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Optimum lighting conditions for your application

LIGHTS FOR VISION SYSTEMS AND MACHINES

Balluff offers a wide range of rugged lights for your various installation spaces and tasks: for optimal lighting conditions in image processing and for machine lighting.

The energy-saving and long-lasting LED technology is impressive with homogeneous optical properties. Moreover, Balluff lighting options guarantee eye safety in accordance with IEC 62471. You can select between red light, white light, infrared light or laser variants.

The most important benefits

- The highest quality (extensive EMC tests, high protection class)
- Easy and fast assembly
- Simple startup
- Rugged, long service life

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PRODUCT OVERVIEW.

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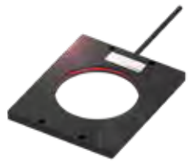
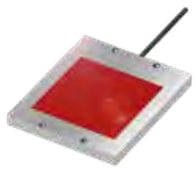
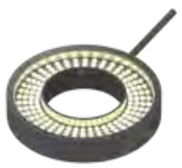
Product family		
BAE dark field lights 	**Powerful and homogeneous lighting for checking surfaces** Our dark field lights are used to check for scratches, pits and impurities on surfaces. Their red light reliably and homogeneously illuminates a light field with a diameter of 90 mm regardless of the material and surface.	**Features** ■ Easy attachment and flexible positioning ■ High-quality housing, IP54 ■ Reliable and powerful ■ First-class materials
BAE background lights 	**Homogeneous and bright lighting for checking for cracks** With our background lights, you can easily check dimensions and shapes and for any material or surface. You can choose between different sizes and different light field diameters (25 × 25 mm to 300 × 200 mm) and variants with red and infrared light. Good to know: Balluff background lights can also be used for diffuse incident lights.	**Features** ■ Extremely flat design ■ Quick and easy installation ■ Versatile and bright ■ High-quality housing, IP54 or IP69K ■ First-class materials ■ Also available as a stainless steel variant
BAE ring lights 	**Ring lights with red light, white light and infrared** The light field size of our ring lights has a diameter of 100/60 mm. As an additional incident light with high-brightness LEDs you enjoy homogeneous illumination. Versions with red light, white light or infrared light are available.	**Features** ■ Easy attachment and installation ■ High-quality housing, IP65 ■ Large inspection distances realizable ■ Diffuser attachment for applications with mirrored surfaces to prevent disruptive reflections

Product family		
BAE strip lights	**Homogeneous, targeted and direct lighting** When used as lateral illumination, our strip lights create shadows to check features. In addition, they provide consistent lighting without glare points. The strip lights are available in various sizes with light field diameters of 10 x 95 mm to 10 x 195 mm. Versions with red light, white light and infrared light are available which are used as direct illumination of the image field.	**Features** ■ Easy attachment and flexible positioning ■ Almost rimless design, making stacking and arrangement in rows possible ■ High-quality housing, IP54 ■ Mounting bracket makes it possible to configure as a square or rectangle or frame
BAE coaxial lights	**Homogeneous illumination with red light for reflective surfaces** Our coaxial lights with red light are optimally suited, for the illumination of highly reflective or mirroring surfaces. Choose here between two different sizes having light fields from 50 × 50 mm to 100 × 100 mm.	**Features** ■ Low-maintenance and industry-oriented ■ Easy installation and integration ■ High-quality housing, IP54 ■ For the inspection of surfaces that are printed or soiled or needle-punched ■ First-class materials
BAE spot lights	**Pinpoint lighting with spotlight** To fill in areas with pinpoint accuracy, our spot lights are the right choice. In addition, solutions of varying size (M12, M18, M30) as well as versions with red light or infrared light are available to you. In each case you benefit from easy installation and less frequent inspections.	**Features** ■ Easy attachment and flexible positioning ■ High-quality housing, IP67 ■ First-class materials
BAE line lasers	**Modulatable line lasers** Our powerful line lasers are used for the detection and measurement of defects, diameters, images, gaps, steps or for presence control. Also usable in industrial image processing and for the alignment and positioning of workpieces or accessories. Balluff line lasers can be triggered, focused and modulated. Of our especially long-lasting solutions, you can select between red, blue and green light types as well as various projection types, from line and grid to matrix and point to cross.	**Features** ■ Robust and compact (M18, M12 design) ■ High-quality housing, IP67 ■ Easy attachment and flexible positioning ■ Easy installation, laser class 1M or 2M (no additional protective measures required) ■ High-quality materials and laser modules ■ Large inspection distances up to 2000 mm ■ Adjustable brightness and zoom
BAE machine lights	**Powerful, durable, universal** Our high-quality LED machine lights series BAE LX are designed for versatility. They are ideal not only for machines, but also for washing equipment, workbenches, test stands, semi-automated workstations and special applications in the automotive industry. Their compact, rugged construction with an IP67 or IP69K protection rating ensures high performance and especially long service life. They are also quick and easy to integrate into your equipment. The BAE LX lights are available in plastic or borosilicate glass and in eleven lengths – from 250 mm to 1200 mm. The plastic versions (PMMA) are available with 20 mm diameter and versions in borosilicate glass with 45 mm diameter. Our products offer you the best possible energy efficiency and an attractive price-performance ratio.	**Features** ■ Shock- and vibration-proof, thermally and mechanically highly rated ■ Protection rating IP67/IP69K: suitable for harsh environments ■ Inexpensive standard M12 plug-in connection is easy to install ■ Homogeneous, large area and, for diffuse versions, completely non-glare illumination ■ Reduces costs thanks to low energy consumption and high-efficiency LED technology ■ Space-saving, compact design with Ø 20 mm or Ø 45 mm and low weight ■ 24 V DC instead of 230 V AC: no grounding needed, increases work safety ■ Simple to install

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PRODUCT OVERVIEW

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Product family		
BNI/BAE signal converters 	**Change output signals or counting and timing functions without additional installations** With our signal converters, you can easily change output signals or numerical and time functions. Analog switching devices for sensors with analog output, signal converters for sensors with switching output and signal amplifiers are available for this purpose. They are flexibly installable in the control cabinet or else on site. For capacitive sensors, you can get capacitive sensor controllers with potential-free changeover contact.	**Features** ■ Analog switching device: switching state is indicated by LEDs ■ Timer function for a capacitive sensor as well as min/max fill level detection for two capacitive sensors ■ Signal converters for sensors with switching output can be combined with each other and are easy to install and adjust

Efficiently transport signals with signal converters

SIGNAL CONVERTERS AND COMMUNICATION ADAPTERS

Our signal converters store an incoming signal in a specific format and output it in a different format.

Frequently, such modules are used in the conversion of analog signals into digital signals or vice versa. Likewise, you can convert different communication protocols using signal converters.

The most important benefits

- Easy to install
- Installation in the control cabinet or directly on the sensor
- Adaptation of the output signal to the application
- Mixture of different signals on one assembly possible
- Cost reduction potential

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We assist you expertly and personally

SERVICES.

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Our products are precisely tailored to your needs. Our services are too, for fast commissioning, optimum process flows and the greatest possible planning security and cost effectiveness. Would you like advice on products and services? Tailor-made solutions? Or expert know-how on site? You receive our comprehensive support: competent, uncomplicated and totally according to your specifications.

Your Balluff solutions

- Technical support
- Training
- Support and consultation
- Development and integration
- Product-accompanying services
- Customer-specific solutions

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Balluff

OPENING UP NEW PERSPECTIVES

Balluff is a leading provider of high-value sensor, identification and image processing solutions including networking technology and software for any automation requirement. Family owned for more than 100 years, Balluff currently employs around 3600 persons in 38 subsidiaries with sales, production and development facilities around the world to ensure your success. Together with our representatives we guarantee the highest quality standards in 68 countries so that you always get the best.

We perform top services for innovative solutions that increase your competitive ability. We deliver a consistent digital focus, manufacturing expertise, and high personal dedication.

We adhere to our motto "Innovating Automation" as pacesetters of automation, refiners and new developers, and technological trailblazers. In open exchange with associations, universities and research institutes, as well as in close contact with our customers, we create new industrial sector solutions for automation. As a future-looking company we keep our eye not only on the traditional areas of automation, but also devote ourselves to the development of holistic applications for an increasingly digital and networked world.

We have the future firmly in view in everything we do. With a sophisticated environmental management system, we protect the environment and handle our resources with care. This also creates for you the best prerequisites for sustained action.

You can always rely on us, our products and our adherence to delivery dates and schedule – all in the name of mutually beneficial partnership.

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FIND YOUR BALLUFF SOLUTION.

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At **www.balluff.com** you will find additional information about us and what we have to offer. Test the convenience of our new web site, with features that are simple and intuitive to use according to your needs.

Research the right products using a product finder by simply filtering by operating principle, area of use, industry or application. You can compare all the products, save them in a wish list and order directly using the online shopping cart. And you will find everything you need to know about using each product: in the "Industries and Solutions" areas you can read cogent application examples.

Do you have questions, requests or suggestions? We are always happy to get a call from you and hear about your needs. Most of all we would like to get to know you personally.

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